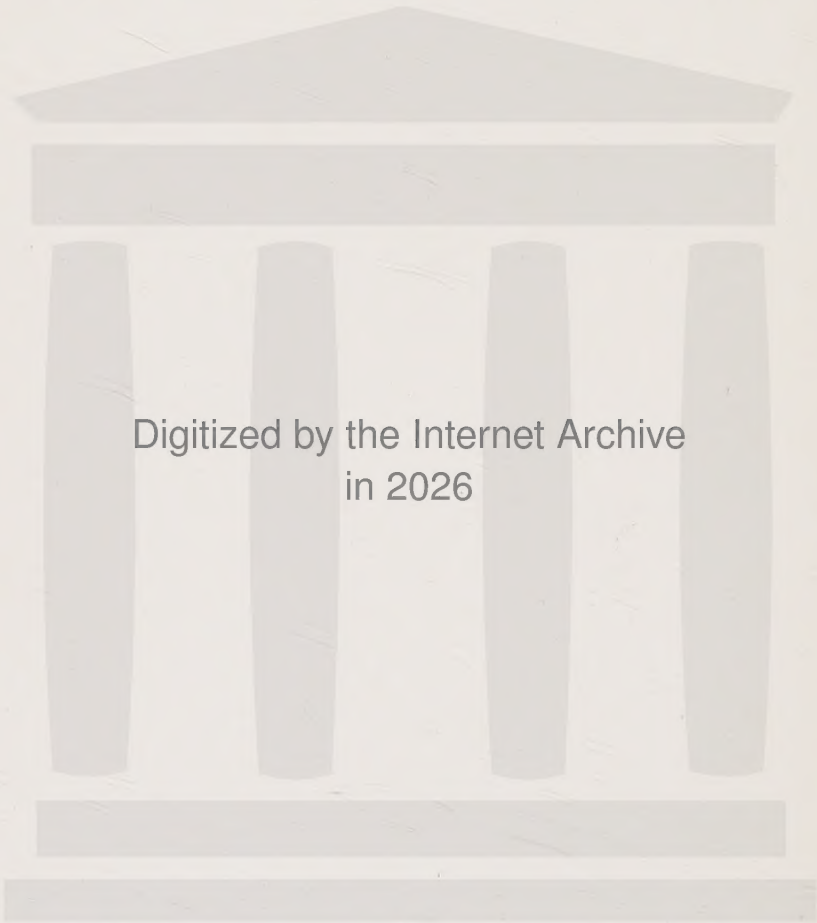
The Great Mackenzie Basin

The Senate Reports of 1887-1888

Issued by direction of HON. FRANK OLIVER

Minister of the Interior CANADA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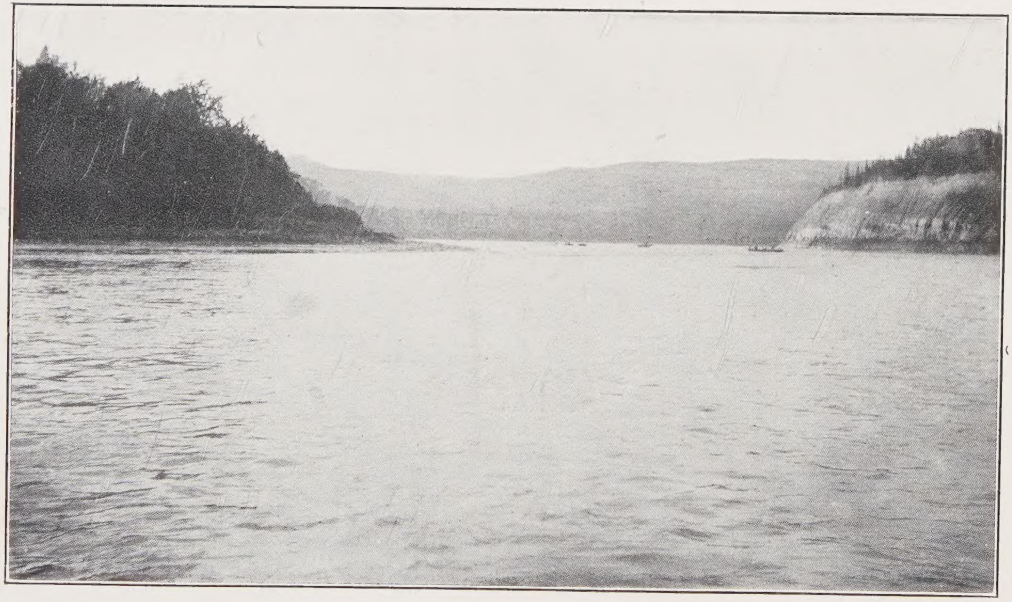
Frontispiece.



On Athabaska above Ft. McMurray, fleet of transports in distance.

THE

GREAT MACKENZIE BASIN

REPORTS

OF THE

SELECT COMMITTEES OF THE SENATE

SESSIONS 1887 and 1888

A Summary of the Reports of the 'Schultz Committees' of the Senate of Canada (1887-88) and of the Evidence heard before said Committees bearing upon the Natural Resources of that Portion of the Canadian Northwest which still remains unexploited

EDITED BY

CAPTAIN ERNEST J. CHAMBERS

Gentleman Usher of the Black Rod

PUBLISHED UNDER THE DIRECTION OF

R. E. YOUNG, D.L.S.

Superintendent of Railway Lands, Department of the Interior

HON. FRANK OLIVER, MINISTER

OTTAWA

PRINTED BY S. E. DAWSON, PRINTER TO THE KING'S MOST EXCELLENT MAJESTY.

1908

5186—A

Department of the Interior,
Ottawa, January 2, 1909.

Honourable Frank Oliver,
Minister of the Interior,
Ottawa.

Sir,—I have the honour to transmit herewith the manuscript, prepared in accordance with instructions from you, of the summary of the reports of the 'Schultz Committees' of the Senate of Canada (1887-8) on the Great Mackenzie Basin, and of the evidence heard before said committees.

I have also the honour of submitting to your attention the accompanying extract with map, from a work just recently published by the United States government, Department of Agriculture, Bureau of Biological Survey, entitled 'North American Fauna, No. 27, a Biological investigation of the Athabaska-Mackenzie Region, by Edward A. Preble, Assistant, Biological Survey.'

This work embodies the results of several years' investigation in that portion of Canada in the interest of science, by Mr. Preble and his assistants, and there is ample evidence in the work that a careful study was made by Mr. Preble of all the reports and printed information available from any source on that undeveloped portion of Canada.

It has been thought advisable that this extract, with the accompanying map, should be printed with this manuscript.

I have the honour to be, sir,
Your obedient servant,

R. E. YOUNG,
Superintendent of Railway Lands.

North American Fauna, No. 27, U. S. Dept. Agr., Biological Survey.

LIFE ZONES OF HUDSON BAY AND MACKENZIE REGIONS.

CANADIAN HUDSONIAN UNCOLORED-ARCTIC

Reproduced by kind permission of Dr. C. Hart Merriam, Chief of the Bureau of Biological Survey, U.S.A.

EXTRACT.

'The northern border of the Canadian zone in the Mackenzie region limits the successful cultivation of barley, potatoes, and the more hardy root crops, although with special care most of them are raised in certain favoured localities in the southern part of the Hudsonian. Even in the Canadian, however, an occasional failure occurs, in the case of the less hardy crops, because of the occurrence of unusually late spring or early autumn frosts. In most parts of the Peace River Valley, and even in the lower Liard Valley, wheat is a successful crop. Peas, potatoes, radishes, turnips, beets, carrots, cabbages, lettuce and onions are raised with a considerable degree of success as far north as Fort Norman, near latitude 65°, near the northern extremity of the Canadian strip. Nearly or all of these meet with a fair amount of success at Fort Rae and also at Fort Good Hope, in the lower Hudsonian, but at Fort Rae the situation is especially favourable as regards slope exposure, and the permanent frost, which remains near the surface in most parts of the Hudsonian, probably retreats to a much lower depth. At Fort Good Hope the almost continuous sunlight of summer probably compensates in part for its extreme northern position.'

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INTRODUCTION

The investigation of the natural resources of the great unsettled, and practically unexplored, northland of Canada, by a select committee of the Senate of Canada during the session of 1906-7, and the publication of the evidence then obtained, first in the journals of the Senate (3rd session, 10th parliament), and, subsequently, in the book published under the direction of the Department of the Interior, entitled 'Canada's Fertile Northland,' have aroused a remarkable interest in the subject, not only in Canada, but throughout the length of the civilized world.

The demand for the publication last mentioned was so widespread that a second edition had to be issued, and the correspondence with the Department of the Interior on the subject of the Dominion's great northern land reserve has so remarkably developed that a separate branch, placed under the direction of Mr. R. E. Young, D.L.S., Superintendent of Railway Lands, has been established to attend to it.

The requests for further authentic information as to the resources of northern Canada, particularly that portion of it which lies between Hudson bay and the Rocky mountains, are urgent and insistent.

With the enquiries on the subject received at the Department often come expressions of surprise that the facts regarding the vast latent wealth of this region brought to public attention by the publication of the evidence produced during the investigation before the committee of the Senate presided over by Senator Davis during the parliamentary session of 1906-7, should have been so tardily revealed.

As a matter of fact, much of this information had been already obtained by parliamentary committees, but as it had not been made readily accessible to the public, it had not attracted general attention.

Those specially concerned in the subject have for many years been aware of the fertility and latent natural wealth of the Dominion's northern hinterland, but, up to the present time, public attention has been mainly directed to the exploitation and development of the resources of the more accessible portion of the region originally known as the 'Northwest Territories,' namely, the districts which lie south of the North Saskatchewan river, and are now comprised in the province of Manitoba and the southern and settled portions of the provinces of Saskatchewan and Alberta. The vast region north of the present settled area—the future home of many thousands of prosperous Canadians—has therefore failed to receive the attention it invited.

It will be remembered by even the casual reader of Canadian history that it was no longer ago than the year 1869 that the region up to that time known by the three designations, 'Rupert's Land,' 'the Hudson Bay Territory,' and 'the Northwest Territory,' was added to the Dominion by purchase from the Hudson Bay Company. The original province of Manitoba was set apart out of a portion of it, and admitted into the Confederation July 15, 1870.

On April 12, 1870, on motion of the Honourable Mr. McCully, seconded by the Honourable Mr. Botsford, the Senate of Canada appointed a select committee 'on the subject of Rupert's Land, Red River and the Northwest Territory, with a view of collecting information respecting the condition, climate, soil, population, resources, and natural products of the country, its trade, institutions, and capabilities, and the means of access thereto, with power to send for persons and papers.' The committee met without delay, and having appointed the Hon. Senator McCully chairman, proceeded with the hearing of evidence, which was taken in shorthand by Mr. J. G. Bourinot (later Sir John G. Bourinot). The committee reported on April 25, 1870. This report, which, with the report of the evidence, was printed in extenso, as an appendix to the Journals of the Senate (33 Victoria), contained the following conclusions:—'The vast extent of country capable of cultivation, the favourable accounts uniformly given of its agricultural qualities, and the salubrity of the climate, leave no room for doubt on the minds of the committee that the region north of the United States boundary, west of the watershed of Lake Superior, and extending north to the northern banks of the Saskatchewan river, is a good wheat and vegetable-producing territory'.....'The committee are satisfied that if measures are taken at an early date to afford facilities for access through British territory to the Red river, it will be found to be not only a very desirable home for immigrants, but will materially enhance the prosperity and promote the best interests of this Dominion.'

At the present date the evidence taken before this committee is chiefly interesting as showing that in 1870 the representatives of the people of eastern Canada were anxious to obtain as regards what is now the large and prosperous province of Manitoba, with a total population of half a million of people, exactly the information which recent parliamentary committees have attempted to gain as to the resources of Canada's newest west, her fertile northland. In 1870 data as to the width, the course and the currents of the Red river and the Assiniboine were sought after just as were similar particulars regarding the Peace and the Mackenzie in 1907. All the witnesses examined in 1870 were closely questioned as to the climate, the timber, the fish, the game and the agricultural development of the little Red River settlement, just as were the witnesses examined before the Davis Committee of 1907 questioned as to the climate, the natural resources and the agricultural development of Canada's fertile northland. None of the witnesses examined before the committee of 1870 had ever been in the district north of the North Saskatchewan. One, Joseph Monkman, explained that he had been up the South Saskatchewan as far as Moose lakes, and up the north branch of the same river as far as Carlton. He had also been along the Qu'Appelle river and had visited the Touchwood Hills. He testified that although the country along the Saskatchewan looked promising from an agricultural standpoint, there were 'no farms along the river.' Most of the witnesses were asked if they had any information as to the 'far northwest,' and all who had heard anything definite regarding that region testified that their information was favourable. Charles Garrett, a former Ontario farmer, who had been upwards of eleven years in the Red River settlement, and expressed himself as decidedly impressed with the desirability of that section of country from the immigrant's point of view, was asked: 'Do you know anything about the more distant portions of the Northwest country?' He replied: 'I have heard it stated that by the Mackenzie river the spring is a fortnight

earlier than with us, and it is the finest part of the country for settlement.' Major Charles A. Boulton (later Lieut.-Col. Boulton, member of the Senate of Canada) was asked a similar question, and replied: 'I have seen persons from the North Saskatchewan and far west, and their accounts are contradictory. Some say the country is subject to drought, hail storms, and some frost. I have heard other persons describe the Saskatchewan district as most beautiful—rolling prairie chiefly. There is no settlement worth mentioning in the district.'

Up to 1874 that portion of western Canada beyond the confines of the infant province of Manitoba was to the world at large a *terra incognita,* which had been penetrated, but along a few routes, by the explorer, the fur trader and the missionary. In the summer of the year named the great district west of Manitoba was 'opened up' by the Northwest Mounted Police as far as Macleod in the south, and Edmonton in the north. In 1885 the completion of the Canadian Pacific Railway main line gave western Canada direct communication with the eastern provinces and a fair chance to develop her natural resources, particularly in the southern section, through which the line was constructed.

The work of transforming the virgin prairies of Manitoba and southern Saskatchewan and Alberta into productive grain fields and pastures is rapidly approaching completion, and places which up to 1880 had never been visited by a white man, are now the sites of large and prosperous cities.

While the work of developing the southern portion of the new western provinces was yet in its infancy the claim of the resources of the great northland to national attention began to assert itself.

Information of a most valuable character on the subject of the resources of northern Canada was obtained by two select committees of the Senate which sat during the sessions of 1887 and 1888, under the presidency of the late Honourable Senator Schultz (1), who was mainly instrumental in having the said committees appointed.

A considerable amount of the evidence given before the two Schultz committees corresponds with, and is confirmatory of the evidence given before the Davis committee in 1907, but there was also some evidence of importance along entirely different lines of research from those followed by the Davis committee.

In view of the interest now existing in the subject of the resources of the northern portion of Canada, the evidence heard before the Schultz committees, and the committee reports based thereupon, have increased materially in value, and the few

(1) The Honourable John Christian Schultz, M.D., is of Danish descent. He was the son of the late William Schultz a merchant of Amherstburg, Ont., and his wife, Eliza, who was the daughter of Wm. Riley, Esq., of Brandon, Ireland. He was born at Amherstburg, Ont., on January 1st, 1840, was educated in Arts at Oberlin, Ohio, and in Medicine at Queen's University, Kingston, and at Victoria University, Cobourg, and graduated as M.D. in 1860. In 1860 he went to the Northwest and practised his profession in Fort Garry, now Winnipeg. At Winnipeg in 1868 he married Miss Agnes Campbell Farquharson, of Georgetown, British Guinea. He was largely interested in the fur trade, and was leader of 'the Canadian party' at the time of the Rebellion of 1869-70 when he was seized, imprisoned and sentenced to death by Riel, but escaped. He gave evidence before the Select Committee of the Senate in 1870. In 1872 was appointed a member of the Executive Council for the Northwest Territories, and also was a member of the Dominion Board of Health, a director of the Manitoba South-Western Colonization Railway, and one of the Board of Governors of the Manitoba Medical Board. He was first returned to Parliament as member for Lisgar on Manitoba entering the Dominion, March, 1871, and sat until the general election in 1882, when he was defeated. He was called to the Senate September 22nd, 1882. He died April 13th, 1896.

available copies of the printed reports of the committees of 1887 and 1888 have been in constant requisition during the past few months.

Under these circumstances it was thought that a summary or digest of the reports of these committees and of all the evidence then heard bearing upon the question of the natural resources of northern Canada, would be useful to the large number of capitalists, prospectors, would-be settlers, sportsmen, and other persons whose attention is at the moment directed to this subject. The present volume is the result.

It will be recalled that the evidence taken by the Davis committee was specially edited and condensed before being published in the Journals of the Senate and by the Department of the Interior. The proceedings before the committee were reported in extenso in shorthand, but before the report so produced was published, the evidence was transformed from the form of question and answer to that of a running narration, and to some extent condensed.

The condensation was confined to the elimination of irrelevant matter, and of obvious repetitions; no essential statement of fact or opinion being omitted. So far as it could be done in rendering in the second person evidence given in the first, the exact expressions and words of the witnesses were used. In short, the attempt was made to present the evidence in as readable, as condensed and as intelligible a way as possible, and, at the same time, to preserve the complete statements and the exact style of each witness.

The same plan has been followed in the preparation for the present volume of the abstracts of the evidence taken before the Schultz committees of 1887-88.

It will be remarked that the object of the committee of 1887 was of a specific and somewhat restricted character, namely, to ascertain the value of the natural food products of the great Northwest, with a view to their development. In the present volume the lengthy references to the subject of the hybridization and cultivation of the native food products have been largely eliminated, and no more of the evidence taken before the committee in question is given than that which relates to the natural resources of the area north of the Saskatchewan watershed, and lying between the Rocky mountains and Hudson bay, resources which the reader of the evidence will be convinced hold out excellent prospects of profitable exploitation.

The system of arranging the evidence methodically, as was done in the case of the evidence taken before the Davis committee, has been followed in the present case. One advantage of this will be that reference between the two volumes is facilitated. The evidence appears in the following pages in the order in which the various witnesses were heard by the committees, and the subjects, as touched upon by each witness, have been classified in order according to the schedule of subjects adopted by the Davis committee, as follows:—

1. Agriculture, including native fruits, &c.
2. Forestry.
3. Fisheries, including also game and fur-bearing animals.
4. Minerals.
5. Climate.
6. Settlements.
7. Means of communication.

The striking fact established by the evidence treated of in this volume is that for many years the pioneers who knew the northland had implicit faith in the future development of large portions of it as an agricultural country.

Russian provinces of the same latitude as the great Mackenzie basin, and possessing no special advantages over that region as regards elevation, climate, soil and natural resources generally, maintain, and have done so for many generations, considerable populations. (Evidence of Dr. Robt. Bell, Prof. J. Macoun, and U. S. Consul Taylor).

In northern Russia, grain is regularly grown within the Arctic circle. (Evidence of Prof. Saunders).

In 1888 the wheat growing capacity of the Peace river country was roughly estimated at 300,800,000 bushels. (Report of Dr. Geo. M. Dawson).

The farther north wheat, barley, oats, rye, &c., can be successfully grown the larger and heavier the ear and the better the quality of the grain. (Evidence of Prof. J. Macoun, Dr. Robt. Bell, Dr. G. M. Dawson, U.S. Consul Taylor).

The farther north live stock graze the better they fatten. (Evidence Prof. J. Macoun).

As long ago as 1852 cows and oxen were kept successfully at Fort Simpson, latitude 62. (Evidence of James Anderson).

Half a century ago stock raising on a small scale was carried on successfully at most of the Hudson Bay Company's posts and the various missions in the distant northwest. (Evidence of H.B. Co. officials).

For upwards of twenty years cattle have been kept with success at Fort Good Hope, within the Arctic circle. In 1888 the Roman Catholic mission at Providence had a herd of 15 or 20 head of cattle, and the mission at Lac la Biche, one of about 80 head. (Evidence of Mgr. Clut). The same year, it was reported that there were at Salt river (lat. 61½) small settlements of half-breeds who had horses and cattle. (Evidence of Frank Oliver, Esq.).

Excellent cattle have been raised from year to year at York Factory and Churchill, and have done very well. (Evidence of Dr. Robt. Bell).

As far back as thirty-three years ago the practice of herding out horses during the winter was an acknowledged success in the Peace river country, and Lesser Slave lake was recognized as 'an excellent place for wintering stock.' (Evidence of Dr. Geo. M. Dawson).

The extent of the forest areas and the commercial value of the timber growing therein could not be estimated, but were declared to be immense.

The wealth of the country in fisheries and in fur and feathered game was declared to be beyond computation.

The discoveries of mineral wealth already reported in 1888 were most important and varied, although geological exploration was acknowledged to be very incomplete.

There was a general agreement on the part of competent witnesses and the written authorities quoted that the warm influence of the chinook winds is, in winter, felt for

a considerable distance east of the Rockies, and as far north as the Arctic circle—in fact, to the mouth of the Mackenzie river.

The lowest temperatures of winter have no injurious effects upon native trees and plants.

The shortness of the summer or growing season within Canada's fertile northland is amply compensated for, as far as vegetable growth is concerned, by the extreme length of the period of bright sunshine every summer day, the nights in the higher latitudes during the growing season being so short that there is almost continuous daylight.

Inland navigation in the great Mackenzie basin, by river channel and lake coast, extends for 6,500 miles, almost continuously.

Those who have read recent reports of explorers, travellers and dwellers in the great Mackenzie basin cannot have failed to remark how fully they corroborate the evidence given before the Senate committees as to climatic and other conditions and the promising appearance of considerable areas of this immense territory.

The most recent official reports which contain any references to the natural resources of the great Canadian northland are those of the officers of the Royal Northwest Mounted Police who have been assigned during the past few years to duty in that region. These reports bear all the more weight on account of the high reputation of the officers of this splendid force for trustworthiness and intelligence, and their general acquaintance with the whole Canadian west, towards the development of which to date they have contributed so conspicuous and honourable a share. A few extracts from one of these reports will indicate the character of the information they contain.

In the summer of 1907 Inspector A. M. Jarvis, C.M.O., was detailed to proceed from Regina to the Mackenzie district to report on the existing herds of wood buffalo. He was accompanied by Mr. E. Thompson-Seton, the well-known naturalist, and forwarded to his corps headquarters an interesting series of reports on his trip. They were published with the annual report of the force for 1907, as an appendix. ('N,' page 122 and following).

June 14, a short distance from Smith's Landing, on the Slave river, the party began the ascent to the upland known as the Salt mountain. The inspector writes in his report at this point:—'This country, and in fact all we have seen here, is, as Mr. Seton pointed out to me, eminently suited for settlement. The ground is a rich clay loam. The growth is chiefly black and white spruce, tamarac, aspen poplar and balm of gilead, while birch and willow abound. The pasture is fine. Plenty of grass, among which is a luxuriant growth of Anemone Pulsatilla (called Crocus in Manitoba), and Avena. The trees, plants, vegetation generally, and animal life, the advancement of the season, the rainfall, the soil, and the different climatic conditions, seemed exactly the same as in central Manitoba. The only important Manitoba tree not observable was the oak. The French priest at Fort Smith assures me that oats, barley, potatoes, and garden truck are everywhere successfully grown, and wheat equally so in some farmed localities. This, it will be remembered, is exactly what was said of Manitoba 30 years ago.

'There seems no reason to doubt that here is a new and far larger Manitoba lying ready for settlement, as soon as it is made accessible by better means of transport. As we rose to the gentle ascent of Salt mountain, the country became diversified, with open glades and small lakes, recalling the west side of Riding mountain.'

June 24, Inspector Jarvis and his party started along a route leading northwesterly from Fort Smith. He reported:—'We went westerly from Fort Smith through a level dry country, covered with jack-pine and poplar, for about nine miles, following nearly the course of Slave river to Gravel point, where we turned southwesterly through a region of swamps and muskegs for nine miles more. This brought us to the Salt river, where we camped for the night. The next day we rode northwesterly along the banks of Salt river, in a region of extensive prairies, some of them wet, some dry, but all covered with a fine growth of grass and capable of supplying unlimited quantities of hay.....From there (the thickly wooded slope of Salt mountain) on, the country was beautiful, the ground was slightly rolling, with occasional lakes, the soil rich, and the timber being spruce, poplar, jackpine and tamarack. The pasture was of the richest description.....Next day (26) after a four hours ride through the same pleasing country, we reached the Little Buffalo river at noon. This is a deep, beautiful stream about 40 feet wide, with swift current, and hard gravelly bottom and banks. About 10.30 on the 27th, we came to the top of the mountain, and had a clear view of a great extent of country below us. To the north were some muskegs, but northeast were the open plains of Salt river stretching away for many miles. We now left the mountain to cross this open stretch, and at noon reached the east side of this prairie, where we camped. Thenceforward we travelled through dry poplar woods of scattered large trees, under which the richest grass abounded. The whole of this region seemed ideal for stock. About 3 p.m. we once more reached Salt river, and followed its banks through the same dry poplar country to its junction with Slave river, which we reached at six o'clock.....On the 28th we rode southerly for two miles through a dense growth of spruce, varied with a few swamps. This gave place to the open poplar woods, with rich pasture, which continued for seven miles, bringing us to Gravel point.....There is a good deal of swamp in this region. There is, however, much land that is dry, rich and eminently suited for ranching and mixed farming.'

This and other recent corroborative reports certainly tend to attract attention to the descriptions given and the opinions expressed by the old pioneers and missionaries who were examined before the select committees of the Senate in 1887 and 1888.

ERNEST J. CHAMBERS.

The Senate, Ottawa, Sept. 1, 1908.

WINTER SCENE ON STURGEON LAKE, EN ROUTE SOUTH FROM FT. CHURCHILL.

PART I

THE SENATE COMMITTEE OF 1887

INFORMATION AS TO THE RESOURCES OF NORTHERN CANADA OBTAINED DURING AN INVESTIGATION INTO THE NATURAL FOOD PRODUCTS OF THE NORTHWEST TERRITORIES.

May 18, 1887, in the Senate of Canada, after a brief explanatory speech, the Hon. John Schultz moved, seconded by the Hon. Mr. Girard: 'That a select committee composed of the Honourable Messieurs Allan, Almon, Bolduc, Botsford, Carvell, Chaffers, Ferrier, Girard, Howlan, Kaulbach, Leonard, McCallum, McClelan, McInnes (B.C.), Macdonald (B.C.), Macpherson (Sir David Lewis), Merner, Miller, Ogilvie, Pelletier, Reesor, Robitaille, Sanford, Senecal, Sutherland, Thibadeau, Turner, and the mover, be appointed a committee for the purpose of collecting information regarding the existing natural food products of the Northwest Territories, and the best means of conserving and increasing them; and that the said committee have leave to send for persons, papers and records. Five to be quorum.'

The question of concurrence being put thereon, the same was resolved in the affirmative, and it was ordered accordingly.

The report of this committee, which was adopted by the Senate on June 18, drew attention to the fact that beyond the then existing districts of Assiniboia, Alberta and Saskatchewan there was a region of vast mineral wealth and other resources. Reference was also made to the well-known climatic law, 'that the nearer we approach the limit of possible cultivation of all cereal plants the greater will be the yield and the finer the quality.'

THE EVIDENCE.

The committee determined at the outset that the best means of systematically collecting information upon the subject of their investigation would be to frame a list of questions indicating the nature of the inquiries to be made by the committee. This was accordingly done, and copies of a list of questions bearing upon the special subject of investigation were sent to such senators, members of parliament, clergymen, government officials, officers of the Hudson Bay Company, leading business men and others, as from residence, travel in, or other acquaintance with the Northwest, would be best qualified to furnish information.

In each case a written reply was requested to the questions or to those of them with the subjects of which the recipient might be most familiar. As many witnesses as possible were examined orally. In this manner much very valuable information was collected as to the natural food products of Canada's great West. (See appendix to the Journals of the Senate, 1887, 1st session, sixth parliament, 50 Victoria).

Considerable evidence still valuable, as to the general character and resources of Canada's unexploited reserve, lying between the Rocky mountains and Hudson bay, and north of the Saskatchewan watershed, was obtained, and in condensed form is republished herewith.

EVIDENCE OF PROFESSOR ROBERT BELL, OF THE GEOLOGICAL SURVEY.

Professor Bell, B.A. Sc., M.D., C.M., F.R.G.S., &c., Assistant Director of the Geological Survey of Canada, and who gave much valuable evidence before the Davis Committee in 1907, was summoned several times before the Schultz Committee of 1887. Dr. Bell explained when first called, that he had travelled over a great part of the Northwest country from the United States boundary line to Athabaska lake in the Mackenzie river country, and to the northern parts of Hudson bay. Westward he had been all the way from Lake Superior and Hudson bay, nearly to the Rocky mountains.

Prof. Bell's evidence as to the resources of and means of communication with the still unexploited far northern regions of Canada, was to the following effect:—

AGRICULTURE.

Potatoes and all such vegetables would grow in the Hudson bay district; but the immediate influence of the sea is unfavourable for gardens. Gardens close to the sea do not flourish as well as gardens inland.

The frequent changes from heat to cold and the fogs from the sea prejudicially affect them, and cause a sort of blight on vegetation close to the sea shore. But a few miles inland vegetation is more rank, and you can grow potatoes and the ordinary root crops.

There are plenty of grasses there to keep cattle and sheep. There are many kinds of grasses there; also sedges, wild peas or vetches, and lentils. They would make splendid feed for cattle.

As to northern agriculture, in those days, Prof. Bell stated that they grew cucumbers and melons as far north as Lac la Biche. He had seen them there himself, and he was not sure but that they grew pumpkins, too. Where cucumbers and melons grow pumpkins will grow also.

It is hard to induce the Indians to grow anything. Even potatoes, which they all know to be a safe crop, they will not grow unless encouraged by supplying them. If supplied with seed in the autumn they will not preserve any over the winter. They would not take the trouble to dig a pit or build a cellar in which to preserve the seed, but in the spring, when the time comes for planting, if anyone were to give them the seed, they would plant it.

Artichokes would be very suitable to introduce amongst the Indians, because they are very hardy and productive; the seed remains in the ground and the Indians could not destroy it all.

FORESTRY.

Prof. Bell, at one of his examinations, produced as an exhibit a branch of the banksian pine (Pinus Bankasiana), often called the jack pine and scrub pine. He explained that this tree extends from southern New Brunswick, northwestward, almost

across the continent. This is about the only tree in North America which we can call strictly Canadian. Both its northern and southern limits are practically in Canada. It runs thousands of miles from the southeast in New Brunswick to the Northwest, in a belt, throughout the Dominion. All other trees which we have in Canada have the southern limit far in the United States, but this one has its southern limit in the Dominion, and its northern limit also as a matter of course. So that it is purely a Canadian tree, and the only purely Canadian tree we have.

In the central part of its geographical distribution it sometimes grows to be a tree of two feet in diameter, but more frequently to twenty inches. The cones adhere very closely to the wood and never seem to fall off, and they never seem to open. Some of those on the branch produced might have been on the tree for fifty years. It would appear as if there were no provision made by nature for getting the seeds out, but the witness had observed that after forest fires, when the cones become partially burned, they immediately open and the seeds drop out. Scorch one of the cones for a few minutes before the fire, the scales will open and the seeds fall out. After forest fires, when the seeds of these cones are loosened in that way, millions of them blow all over the country. In a brulé you will see them sticking in great clusters on the trees and the seeds blowing everywhere. A few years after a fire of that kind the young trees are seen growing in countless numbers all over the country, so that it would seem that fire must have been a natural phenomenon from the beginning. Some of those cones look fresher than others, and doubtless some of them have been on the branches a great many years.

These cones are the shape of a small horn ,and grow with their points turned into the tree, and this extremity, also, sometimes, becomes embedded in the wood. It is a very abundant tree all the way from New Brunswick to Alaska. Witness had seen the trees himself all the way from the seaboard of the Atlantic to the Athabaska country, and they have constantly this peculiarity. No animals seem to open the cones, and the only means of propagating this species is by fire. He had scorched the cones himself, and the process had always the effect of setting free the seeds. You will see the same thing in nature after a forest fire, and cones in which the seeds have been imprisoned for half a century are then opened. Some of those cones may have been one hundred years old. The cones adhere directly to the wood, and have no stem at all.

In height this tree grows one hundred feet and upwards. Witness had seen them six feet in circumference. The largest trees that he had seen of this species were in the upper waters of the southern branches of the Albany river. In general, trees attain their greatest perfection in the centre of their geographical distribution. Sometimes they degenerate into brush, at the outside edge of the territory in which they grow. As you go north, south, east or west, they may become smaller and smaller until they die out, but this is not the case with all kinds of trees.

Were a wooded district burned over completely, in process of time a new growth of banksian pine would spring up, also aspen poplar and white birch. The aspen is found as far north as the banksian pine. The seeds of the aspen are very largely distributed, and the witness supposed they existed in the soil before the fire. They also, in some cases, sprang up again from the root. He had seen large districts covered with the banksian pine alone, and no other tree whatever.

The banksian pine is not particularly valuable for lumber. It resembles the red pine; has a coarse, distinct grain and can be used for many purposes. In England it would be used for the manufacture of fashionable bedroom furniture.

It is something like the pine of Florida and Georgia, which has been used for some years past in England in the manufacture of furniture. It would become an article of commerce if means of communication with the northern forests were provided. The banksian pine would make good ties, telegraph poles, and timber for general purposes, besides fuel. In groves it grows very straight, but it is more apt to be branchy than red pine. Witness had seen hundreds of them in groves, affording logs of from 20 to 22 inches in diameter—two or three logs to a tree. Witness had

himself seen this pine as far north as Lake Athabaska, and it had been noticed far down the Mackenzie river, and west to the Rocky mountains. It grows very rapidly. He had seen it, in his own experience, within fifteen years, growing to be useful trees, whole tracts had been covered with good timber.

The aspen and the rough-bark poplar grow farther north than the banksian pine, and also spruce and tamarack.

Prof. Bell, in reply to a question, said he had seen cedar trees north of the Lake of the Woods. The cedar is peculiar as to its northern limit. Starting from the west, on the east side of the valley of the Red river, the line running north is very well defined indeed and runs close to the southeast corner of Lake Winnipeg; it then turns eastward and northward, and crosses the centre of Lonely lake. It still runs northeastward and sweeps around to the east and takes in the most northern part of At-ta-wa-pish-kat river. The cedar does not diminish much in size as it approaches its northern limit. The most northern trees witness had seen were small, but they were not very far from large timber. Cedar requires moisture at its roots—moisture and air. In the most northern parts of its distribution it grows almost entirely on the edges of rivers, as a sort of fringe between the water and the other kinds of trees behind. Occasionally you get a swamp inland which is full of cedars, but as a rule they grow close to the water's edge.

Asked whether the shores of James bay and Hudson bay are wooded, Prof. Bell explained that on the east side of those bays the forest extends north to Richmond gulf and a little beyond, and on the west side to Seal river, a little beyond Churchill. Commercial timber could be obtained from all the rivers flowing in from the south, and jack pine from some, and spruce and tamarack from all the rivers of James bay. This would be all of merchantable size, not extraordinarily large, but plenty of it. The spruce might be described as generally of a small size, but making up in quantity in the number of logs that might be obtained. The tamarack, though, is large.

Prof. Bell explained that although the ordinary sugar maple does not grow in the Northwest, there is a tree there which yields sugar—the ash-leaved maple, sometimes called the Red river maple. It is a very pretty tree, grows rapidly and yields a rich sap. This tree grows native in all the more southern parts of the Northwest country along the rivers, and Prof. Bell had seen it cultivated by the missionaries where it does not grow naturally. It is cultivated at Lac la Biche, some three hundred miles northwest of its natural northern limit. The missionaries at Lac la Biche cultivate it for the purpose of getting sugar from it. This sugar is capable of being refined. The sap contains two and a half per cent of sugar to its weight. The Indians boil down the sap of this tree to make sugar; it is the maple sugar of the Northwest. The tree might be cultivated not only for sugar, but for shelter and fuel and general purposes. It is a hardy tree, and it has been found to thrive far away from its native soil. It is a large tree. Witness had seen it nearly as large as our sugar maples in eastern Canada. It grows very rapidly. It would grow to be a serviceable tree in fifteen or twenty years.

FISHERIES, FUR AND GAME.

The cariboo is abundant around Hudson bay. There are two kinds of cariboo, the woodland and the barren-ground varieties. The latter roam about in herds of many thousand, travelling in various directions. They are somewhat migratory. It is not difficult to reach them. The great trouble is the uncertainty of their migrations. Witness had known Indians to go from woodland regions to hunt for them in the barren grounds, and if the cariboo did not follow their usual migrations, the Indians had been obliged to go for a long time without food. The Indians have starved to death in considerable numbers, and later the cariboo had come into the vicinity in countless numbers. If the Indians had the means of waiting for the cariboo until they did come, they could have an abundant supply of excellent food. The cariboo is very easily killed. The Esquimaux shoot them with bows and arrows. They waylay them and shoot them from behind rocks with arrows tipped with iron or with flint.

The wood buffalo is not at all the same as the musk ox, not even the same species, but is the same as the prairie buffalo. Witness had been in the country the musk ox inhabits, but he had not seen one in the flesh. He had seen their skins, their bones and horns, but not the animal itself. They are migratory, like the cariboo. They do not go as far south as the forests, but they are abundant in the country northwest of Hudson bay and thence westward to Mackenzie river, and also in the northern Archipelago. They are found abundantly as far north as human beings have even penetrated. They are found in northern Greenland and on all the large islands of the Arctic seas. They are not found west of the Mackenzie river, but many years ago they did exist there abundantly, because you find their skulls, bones and horns in the swamps of that country. There are none of them there now, but they are widely diffused in the country eastward. Their skin is more valuable than that of the buffalo. The hair and fur are longer and finer, but the flesh is not so good as buffalo meat. It has a musky taste, and the animal is small compared with the buffalo—between the sheep and the ox.

Prof. Bell, in reply to a question by Senator Girard, said he had seen wild fowl in the region about Hudson bay in large numbers, and if you were close enough up to them, and surprised them in a marsh, they would rise in such clouds that they obscured the sky for a few moments until they got away. They would not darken the land in their flight, but they would prevent one seeing the sky or the sun for a few seconds.

The Indians feed on these birds for some weeks in the autumn and perhaps a week in the spring. They are easily shot wherever they touch to rest in their migration. For instance, at the west end of Lake Athabaska, and on both shores of Hudson bay down to the south end, they accumulate in vast numbers—at the south end of James bay—before they start for the southwest—both the Canada geese and the wavies. There are also two or three other species found in the northern country—what is called the laughing goose, and also a small wavie called Ross' goose.

The same species of water fowl and other birds, in a general way, are found in Hudson bay that are seen in the Northwest, but there is some difference in the species. Some of them migrate northwards and southwards on the eastern side of the continent, and others migrate north and south on the western side of the continent, and therefore you might not have the same species in the northern regions on the east side of Hudson bay that you have in the northern regions on the west side. They are the usual salt water fowl that you find almost everywhere. On the shores of Hudson bay and Straits you have all the sea birds that you find in the northern part of this continent, and some of those of Europe. Some species are abundant; surf ducks, scoters, eider ducks, &c. The eider duck is valuable on account of its down. Of geese, the grey goose and blue and white wavies are very abundant in the spring and autumn on the shore of Hudson bay—and especially towards the southern parts of James bay. Swans are common. They breed on the islands, and some on the shores of Hudson bay, and their skins are an article of trade. In former years swans' down was used for trimming ladies' garments, and swans' skins formed an item of export for the Hudson Bay Company. White bears are found in the northern part of Hudson bay, and there are plenty of black bears around the southern parts. The white bear is principally found at Cape Wolstenholme at the western entrance of Hudson straits.

The most immediately profitable products of the region immediately around Hudson bay are the rich and valuable furs which have been traded in for the last two hundred years by the Hudson's Bay Company.

There are valuable fisheries too. Salmon are not found in James bay, but in Labrador and Hudson straits you get the common salmon. This is exactly the same salmon that is found below Quebec. It is found around the Labrador coast and in the entrance to Hudson straits—in the Georges river ,and the Ungava or Koksoak. There are codfish in Hudson bay. The variety the witness had seen is called the

'rock cod,' which is not of as good quality as the common variety of the Atlantic, but he understood that it is the same species.

The variety of fish known as sea trout, are found in the mouths of the rivers running into Hudson bay and James bay. They do not go far up the stream; they are never found beyond the first fall in a river. There are sea trout in both Hudson bay and James bay, at the mouths of the rivers. They are the same variety as found on the Atlantic coast. They have the same habits. There is also the speckled trout. The marine animals—fishes and mammals of Hudson bay—have precisely the same habits as similar species have on the Atlantic coast.

There are eels too, in the northern waters, but not the same eel as we have here. It is a small reddish eel. The witness had seen it both in Hudson straits and bay; and also lampreys. Herrings come into the entrance of Hudson straits, but they do not go far in.

There are salt water lings in the far northern waters of good quality; also fresh water lings, the liver of which is very good food. The liver is eaten by the Indians and by the white people too. They are very abundant in the lakes and large rivers, and in winter time they are caught with hooks and lines through the ice. The Indians eat the livers and throw the rest of the fish to the dogs, and possibly that is the reason why it is also called dog-fish. Witness had also seen small flat fish in Hudson straits. There are no turbot in the Hudson bay that witness was aware of.

Asked as to the shell-fish in Hudson bay and James bay, Prof. Bell stated that there is an abundance of mussels—the common blue mussels, and white clams. The latter form the food of the walrus, just as the sturgeon lives on cyclas in the North-west waters. They are very small in proportion to the size of the animals which feed on them. There are no lobsters up there, but there are crabs. The kind witness had seen are what are called spider crabs. They do not grow very large. They might be eaten, but witness had never seen the Indians use them as food. There are many things which poor Englishmen eat that the Eskimos would not pay any attention to as items of food. For instance, there are shrimps in abundance, which are not used by the Eskimos.

The small white whale is very abundant in Hudson bay, and there are some large whales there. In the northern part of Hudson bay the black whale has been found and has been killed in considerable numbers by whalers for the last 150 years.

The fur seal is not found there, but the seals of Hudson bay are valuable for their oil. They are tolerably abundant. There are six species of seal in the bay. There is the bearded seal, for instance, which grows to the length of thirteen feet, the ringed seal, the Greenland seal in Hudson straits, the grey seal, and the harbour seal, which is quite common in those waters, also the spotted or fresh-water seal. The latter run up the rivers after salmon and whitefish. It is a large spotted species with an almost white or light grey coat, with distinct black spots thickly scattered over his body. This seal ascends the rivers for long distances inland, sometimes as much as 200 miles. They live on fish, and they sometimes remain in the lakes in the interior. The skins of these seals are valuable, making very good coats.

As to James bay, the best fish there is a variety of whitefish, apparently identical with the large whitefish of Lake Superior, only the fish grow larger in the cold waters in the north. The whitefish live equally well, if not better, in salt water. They run up the rivers also. They belong to the salmon family. Then there are trout of different kinds, and at the northern part of James bay there is Hearne's salmon. They are small salmon, but of very fine quality. The flesh is equal to that of the common salmon, perhaps better. It is firm and red and well flavoured. Hearne's salmon seldom exceed ten pounds in weight. It is also found all around Hudson bay, and on both sides of Hudson straits.

Porpoises, or more properly speaking, the small white whale, are abundant in James bay.

Prof. Bell expressed the opinion that the fisheries of Hudson bay, will, no doubt, be very valuable. It would be strange if such large bodies of salt and fresh water did

not contain valuable fishes. The home of the best fishes is the cold waters of the north, both salt and fresh.

Even the country about Hudson straits, on the extreme northeast, he considered not unsuitable for settlement, although nothing could be grown there in the open air, but the natural flora. Men could live there by fishing and hunting. There would be abundance of herring and codfish too at the entrance of the straits. In fact it is probably the best fishing ground for commercial fish to be found in the north.

MINERALS.

Prof. Bell explained that previous to his own examination of the locality, anthracite had been found on Long island in Hudson bay; but he thought the quantity was small. It was of first class quality, and was found on the southern part of the island, just as you pass out of James bay into Hudson bay, on the east side. The island is about thirty miles long. Lignite had been found inland in the country south and west of James bay. It belongs to a more recent geological formation than the lignite in the vicinity of Edmonton.

Witness did not examine the vein of anthracite on Long island himself, but some members of his party did. He had previously got specimens of it from some of the natives and thought he had missed the place; but one of his men found it one day and neglected to tell him of it until the party left the island, and Prof. Bell did not have an opportunity of examining it himself.

Literally inexhaustible quantities of iron are found along the east side of Hudson bay, on the islands, and probably in James bay also. Witness had not found it in place in James bay, but thought it occurred there. A very small amount of exploration had at that date been done in that region, and witness had to judge from indications. In the drift, that is the boulder clay, derived from the bed of James bay, there was an abundance of iron ore.

On the Abittibi river the limestone contains traces of petroleum. Speaking of petroleum, the witness remarked, 'probably the greatest field for petroleum in the world is the Athabaska country.'

There is no coal in the Hudson straits region, but plenty of iron, besides mica and graphite, or plumbago. Witness had found both gold and silver about Hudson straits, and in some parts of the Hudson bay region. The gold was found in pyrites and as free gold. Free visible gold has been found in quartz at Repulse bay. Up to that date witness had not had an opportunity to satisfactorily investigate the mineral resources of the country. His own opportunities for discovery were limited on account of the fact that when he was at the most likely places for finding gold or silver, he had very little chance to get ashore. He had to take just what opportunity he had when going ashore with boats for ballast or to land materials at the stations. The main object of all the expeditions was to establish and supply the stations. If he had had an expedition under his own control, fitted out for that object, he had no doubt he could make valuable discoveries of minerals, as he had then a sufficient knowledge of the geography and geology of the country to explore successfully. He saw some of those quartz ledges himself. They varied in size. He could not look entirely for economic minerals, for in the few hours he had at any place, he had to ascertain as much as possible of the geological structure of the country, and, incidentally, if he found anything worthy of notice, he brought away specimens. He saw many large veins of quartz, but those from which he brought the specimens which happened to contain gold and silver, were not as large as others he had seen. Some were several feet wide. He did not find visible free gold himself at all. The free gold he spoke of as coming from Repulse bay was noticed by Professor James Tennant, of King's College, London, England. Plenty of copper has been found up there. Witness had found it in small quantities himself, and it had been found as occurring in large quantities among specimens brought from the west coast of Hudson bay by others.

There has not been much work done as yet in mining in that country. Some lead ore has been mined in the vicinity of Little Whale river, and sent to England, but no large amount of money has been spent on mining.

EVIDENCE OF MR. THOMAS McKAY, OF PRINCE ALBERT.

The evidence of Mr. McKay was interesting as being that of one of the western pioneers, who had known the country in 'the old buffalo days.' He had only been as far north as Green lake, but was familiar with conditions existing much farther north.

He explained that at the date of his examination the antelope was to be found in small numbers in the southern parts of the Northwest. In the northern parts he had seen the moose, the red-tailed deer, the black-tailed deer and the cariboo or reindeer. The latter animal was very plentiful in the Mackenzie river country.

The black tailed deer is somewhat similar to the red deer, only smaller. It has the same shape and points, only the size is smaller. It would weigh about 150 pounds or so. It lives in the bush. In the prairie country you find them along the streams where the streams are fringed with timber. They are never to be found in the open prairie country. The antelope, however, frequents the prairie country.

As to the extermination of the buffalo of the plains, it was due to the demands of trade and to the ease and pleasure of buffalo hunting. All the plain Indian had to do in the old days was to get his horse and mount him, and it was then only pleasure hunting the buffalo. Witness had had some experience of it and knew what it was. It was something like fox hunting. All that the Indian of the plain had to do was to mount and kill as many buffalo as he required and leave the rest of the work to the squaws. They did all the work of cutting the meat and curing it, and all the Indian did after hunting was to go to his tent, lounge in the most comfortable part and relate his exploits. They had three ways of killing the buffalo: hunting, pounding, and stalking. The buffalo would go south in summer and north in winter, and the Indians would generally attack the herds migrating north. The buffalo would go north in winter for shelter. Formerly when the buffalo were plentiful they were found in great numbers north of the Saskatchewan. There is a prairie there that is well sheltered by timber, and the buffalo naturally take to shelter ,especially in severe weather.

The extermination of the buffalo is not due to the building of the Canadian Pacific Railway. The slaughter was going on for years while the country was in the possession of the Hudson Bay Company. The extermination of the buffalo is largely due to the fact that it was hunted all the year round. The herds had not an opportunity for breeding. For years and years before the total extermination took place it was very rare to see a calf or a young animal among the herd. They had no rest—they were hunted in all directions. They were hunted not only by the half-breeds and Indians, but by the whites, including the Americans. The Americans went into the buffalo robe trade very largely, and in fact in 1879 and '80, there were some 300,000 buffalo robes sent down to United States territory. Two or three years afterwards there were only three or four thousand.

The only buffalo in existence in a wild state were some bands of wood buffalo in the Mackenzie river country. And they were also disappearing very fast. The only way to protect them was to enforce the game laws. It would be impossible to drive these animals south to the prairie country.

It is as much as a man can do to get within gunshot of them. They are very wary. They are very much the same as the prairie buffalo, only they have taken to the woods and have grown much larger. They are less disturbed there and get more to eat. The prairie buffalo was constantly disturbed. The fox, the wolf, and all the animals that frequent the north seem to grow larger and to have better fur than those that are found farther south. Some say that the wood buffalo is a different animal from the prairie buffalo, but witness thought it was the same animal, only it had a better opportunity to live.

The above is a drawing of a buffalo pound near Fort Carlton on the Saskatchewan, by Sir George Back, then Lieutenant Back, in 1820. It is reproduced from Sir John Franklin's "Journey to the Polar Sea," 1819-22.

MINERALS.

For some years salt had been obtained from springs in the Saskatchewan district, and at Lake Athabaska rock salt was obtained. All you had to do was to shovel it up without any other process at all. People went there annually with a boat and got all the salt they required for the supply of their different districts. They took it in its natural state. They just quarried it out. It was the same with tar. They got all the tar they required for pitching their boats—pitch tar. They got it oozing out of the stream. It had the same smell as ordinary pitch tar. Petroleum was plentiful up there, too, but of course railways were required to develop it.

EVIDENCE OF J. BEAUFORT HURLBERT, M.A., LL.D.

Doctor Hurlbert, formerly compiler of meteorological charts, Ottawa, explained that he had travelled in the country north of Lake Winnipeg and the Saskatchewan, and had read accounts of the travels of Sir Alexander Mackenzie, Sir John Richardson, Franklin, Thompson and others in the region beyond.

In his evidence, Dr. Hurlbert explained that in estimating the cultivable area of northern Canada, the 'comparative value of prairie and wood land has not been sufficiently considered. The absence of forests is undoubtedly caused mainly by climatic defects, and this defect is the deficiency of moisture. The areas of summer droughts in the old and new worlds are identical with the treeless regions. This climatic defect must operate permanently and with increased intensity upon plants. A climate destructive to forest trees could not be propitious to fruit trees nor indeed to the staple plants of the temperate zone.

The areas over which the cereals, coarser grains, root crops, the hardier fruits and grasses mature in the Northwest territories are enormous. Sir John Richardson found wheat grown with profit north of Great Slave lake, north of latitude 60°, and Bishop Taché found it up to latitude 62°. On this continent it cannot be grown with profit south of latitude 39 degrees in the interior, and at 42 degrees on the coasts, except at certain places as at high altitudes. Canada, therefore, possesses the chief areas for wheat in North America. Rye and barley mature from four to five degrees farther north than wheat. The hardier roots and the grasses go still farther north. In round numbers there are probably 900,000 square mile where wheat will ripen west of Lake Superior and east of the Rocky mountains, and larger areas of barley, rye, root crops and the grasses. Here, as in all countries, there are exceptional localities; but the Northwest, containing so many large rivers, in the valleys of which are the chief grain-bearing lands, has a less percentage of poor soil than most countries.

In Europe the grape ripens up to latitude 51 and 52. As the summer temperatures are higher inland in the Northwest Territories than in parallel latitudes in Europe, the grape would mature even beyond that parallel. It has been found growing wild as high as latitude 51° in the Northwest.

The apple, like the cereals, has its proper home north of the summer isothermal of 70°, in the cooler parts of the temperate zone, the areas of the summer rains. In warmer climates the fruit is inferior in quality, if good in size. The Canadian apple is the standard of excellence even in the United States. In Europe it matures as high as latitude 64°, and thrives well up to 60°. The area in the Northwest over which the apple could be cultivated (the hardier varieties) would probably nearly equal that of wheat.

With regard to plants, we must consider climate more than soil, because where the climate is good there will always be soil sufficient to produce those plants. So that the kind of soil is not the chief thing; the question of climate comes in and the summer temperature in the interior of the Northwest is higher than in the interior of Europe?

EVIDENCE OF H. J. MOBERLY.

Mr. H. J. Moberly, chief trader of the Hudson Bay Company at Rapid river, Cumberland district, forwarded his evidence in writing. He explained that he knew the Saskatchewan (north) river and valley from the mouth of the Saskatchewan on Lake Winnipeg up to its source in the Rocky mountains. He also knew the Athabaska river and valley from its source down to its mouth in Athabaska lake, and was well acquainted with all the country between those two rivers, from the Rocky mountains down to Carlton, and from there, taking a line via Green lake, Beaver river, Isle a la Crosse lake, Deep river. Buffalo lake, River and Lake La Loche, Methy Portage and down the Clearwater to its junction with the Athabaska river as an eastern line and the Rocky mountains as a westward. He knew well all the country between the Athabaska and Peace rivers from their mouths to their sources. He had been all through the Rocky mountains from the Saskatchewan (north) to the Peace river, both on the east and west slopes. He knew the Fraser river from its source down to Soda creek, which is some 120 miles below the Quesnelle mouth, and from Quesnelle mouth to the Cariboo mines and up the Stewart's lake river and Fraser's lake river, and the country between Fraser's lake, Babine lake, Bear lake, Lake Tatler and McLeod's lake, and from there down the Parsnip river (south branch of Peace river, west of Rocky mountains) and up the Finlays branch (north Peace river, west of Rocky mountains) as far as the Ominica mines. He had been twice down to York Factory, on the Hudson bay, via the boat route from Lake Winnipeg, and he had passed from Lake Superior by the canoe route to Lake Winnipeg. He went west in the Hudson Bay Company's service in 1854 to the Saskatchewan, and was in charge of the Rocky Mountain House, Jasper House, Lac la Biche, and Fort Assiniboine, and was employed a great deal in travelling about the country in charge of various parties till 1861. From 1861 to 1864, he was in charge of Fraser lake on the west side of the Rocky mountains, and also travelled a good deal through that country. From 1864 to 1870 he was travelling on his own account through the country on the upper Fraser, and through to the Ominica mines, also through the Rocky mountains from Peace river to the Athabaska and all over the Upper Peace river east of the Rocky mountains as far down as Vermillion. From 1870 to 1878 he was again in the Hudson Bay Company's service in charge of Methy Portage and Fort McMurray on the Athabaska river. From 1878 to 1885 he was in charge of the Lower Peace river from Vermillion to Athabaska lake. He had been up from Lake Winnipeg via Pine lake (Cumberland river) to Rapid river (Lac la Rouge), where he was in charge at the date of writing.

FISHERIES, GAME AND FUR.

Mr. Moberly gave an interesting table of the distribution of various kinds of fish, birds and animals.

Lake trout is found in almost all the large lakes all over the country, and river trout in the Athabaska, the Peace river and other streams close to the Rocky mountains. Speckled trout and mountain trout are found in waters on the east and west slope of the Rocky mountains, whitefish, all over the country from the Saskatchewan north, in lakes and most rivers; pickerel, in most lakes; jackfish or pike in most lakes; suckers, in all waters; gold-eye, Athabaska river, Peace river and their tributaries; a peculiar kind of salmon' (doubtless the inconnu), in the Mackenzie river as far up as the Salt river rapids, above Great Slave lake.

Ducks are found all over the country and geese and swans along the Athabaska, the Peace river, the Mackenzie river, the shores of Hudson bay; cranes, along the Athabaska, Peace and Mackenzie; prairie chickens, Athabaska and Peace river countries; ruffled grouse and spruce partridge all over the Northwest Territories; ptarmigan, Athabaska, Peace river, Mackenzie river, Hudson bay; plover and snipe, all over the Northwest Territories.

As to wood buffalo, at the time Mr. Moberly wrote, there was a band, probably about 200, between the Saskatchewan and the Athabaska. They kept on the mountains between Lac la Biche and Fort McMurray. Another band, probably about 300 strong, was between the Athabaska and Peace rivers on the Thickwood and Birch mountains. A third band, probably 700 strong, was scattered through the mountains between the Liard and Peace rivers, and from Salt river to the foot of the Rocky mountains. Moose ran all over the wooded country north of the prairies and east of the Rocky mountains.

The distribution of other game and fur animals in far northwestern Canada was given by Mr. Moberly as follows:—Reindeer (Cariboo), large, all over the wood countries from Saskatchewan, to the barren grounds of the north; reindeer, small, all over the barren grounds in the north, and come south in winter as far as Lac de Brochet, Athabaska lake and Peace river, close to Rocky mountains; red deer, Athabaska and Peace river valleys; black tail deer, jumping deer and chevreux, same country as the red deer; black and brown bears, all over the wooded country and Rocky mountains; grizzly bears, Rocky mountains, valleys of the Peace, Athabaska, Liard, and Fraser, but seldom farther than 250 miles from the foot of the Rockies; beaver, Athabaska, Peace river and in fact all over the wooded country.

Unfortunately, Mr. Moberly, and most of the competent witnesses examined before the Schultz Committee of 1887, gave no evidence as to the agricultural and mineral resources of the country.

PART II

THE SENATE COMMITTEE OF 1888

THE RESULTS OF AN ENQUIRY INTO THE RESOURCES OF THAT PART OF CANADA NORTH OF THE SASKATCHEWAN WATERSHED AND LYING BETWEEN HUDSON BAY AND THE ROCKY MOUNTAINS.

March 27, 1888 (2nd session of the sixth parliament) the Honourable Doctor Schultz, in an interesting speech, drew the attention of the Senate to the value of the Great Mackenzie Basin with a view to an enquiry into its possible commercial and agricultural value.

The honourable gentleman proceeded to show that the region north of the Saskatchewan watershed and lying between the Rocky mountains and the Hudson bay, comprised a territory as large as the whole of France, Germany, Austria, Italy and Spain together, and possessed economic possibilities great enough to warrant serious consideration and exhaustive investigation. He claimed, and quoted well-known authorities in support of his contention, that a very considerable portion of this area is fitted for the production of cereals; that its forests and mines were valuable, its fisheries, extensive and important.

Senator Schultz expressed his wish that the Senate would consent to the striking of a committee as the natural sequence of the Food Committee of the preceding session, just as that committee was the natural outcome of a memorable committee of the same House, which, reporting in 1870 upon the future possibilities of the Northwest, gave to Canada an idea of the richness of the possessions they had acquired, and an impulse to the stream of immigration.

After a debate of considerable length and much interest, the Hon. Dr. Schultz introduced the following resolution, which passed without division:—

'That a select committee composed of the Honourable Messrs. Almon, Bolduc, Botsford, Carvell, Chaffers, Ferrier, Dickey, Girard, Howlan, Kaulbach, Leonard, McCallum, McClelan, McInnis (B.C.), Macdonald (B.C.), Macpherson (Sir David Lewis), Merner, Miller, Ogilvie, Pelletier, Ressor, Robitaille, Sanford, Sutherland, Thibaudeau, Turner, O'Donohoe, Poirier, Power, Macdonald (Midland), Hardisty, Gowan and the mover, be appointed to inquire as to the resources of that part of the Dominion lying north of the Saskatchewan watershed, east of the Rocky mountains and west of the Hudson bay, comprising the Great Mackenzie basin, its extent of navigable rivers, lakes and sea coast, cf agricultural and pastoral lands, its fisheries, forests and mines.....'

THE COMMITTEE'S REPORT.

The report of the Select Committee, adopted by the Senate on motion of the Hon. Dr. Schultz, June 18, 1888, contained the following conclusions:—

Your committee may explain that very early in their investigations they became convinced that very little more was known of the northern and eastern portion of the area committed to them for investigation than was known of the interior of Africa or Australia. Arctic explorers had indeed traversed its coast line and descended two of the rivers which, east of the Mackenzie, flow into the Arctic sea, but the object sought by them was one which had no relation to that of the present inquiry, and it is only incidentally that their records are now valuable. The knowledge of missionaries and officers of the Hudson Bay Company is chiefly confined to the water-courses and the great lakes, while scientific exploration has not as yet extended north of Great Slave lake.

AGRICULTURE.

Within the scope of the committee's inquiry there is a possible area of 656,000 square miles fitted for the growth of potatoes, 407,000 square miles suitable for barley, and 316,000 square miles suitable for wheat.

There is a pastoral area of 860,000 square miles, 26,000 miles of which is open prairie with occasional groves, the remainder being more or less wooded; 274,000 square miles, including the prairie, may be considered as arable land.

About 400,000 square miles of the total area is useless for the pasturage of domestic animals or for cultivation, this area, comprising the barren grounds and a portion of the lightly wooded region to their south and west.

Throughout this arable and pastoral area latitude bears no direct relation to summer isotherms, the spring flowers and the buds of deciduous trees appearing as early north of Great Slave lake as at Winnipeg, St. Paul and Minneapolis, Kingston, or Ottawa, and earlier along the Peace, Liard, and some minor western affluents of the Great Mackenzie river, where the climate resembles that of western Ontario.

The native grasses and vetches are equal, and in some districts, superior, to those of eastern Canada.'

FORESTRY.

The forest area has upon it a growth of trees well suited for all purposes of house and ship building, for mining, railway and bridging purposes, far in excess of its own needs, and of great prospective value to the treeless regions of Canada and the United States to the south. The growth on the Laurentian formation is scant, but the alluvial portion has upon it (on the river of its name and elsewhere) the 'Liard,' a balsam poplar, sometimes called balm of gilead or rough bark poplar, 120 feet high, with a stump diameter of 5 to 6 feet; the white spruce, 150 feet high, with a stump diameter of 4 to 5 feet; the larch, of about the same size, and the banksian pine, whose straight stem is often 100 feet long, with only two feet of diameter at the stump.

FISHERIES, FUR AND GAME.

'The immense lacustrine area of the eastern and northern portions of the area under consideration implies, from the evidence given regarding the quantity and quality of fresh water food fishes, the future supply of a great portion of the North American continent; while, though there has been obtained less evidence regarding sea fish, yet the following have been found on the northern and eastern coast within the scope of the present inquiry, viz.: salmon, on four of the rivers emptying into Hudson bay on its western shore, and in all the rivers flowing into the Arctic ocean,

except the Mackenzie, where an entirely different but also valuable species, the Salmo Mackenzie, having the local name of the Inconnu, exists in great numbers. The capeling is found on the coast of the Arctic ocean and Hudson bay, thus implying the presence of cod upon banks near by, and the rock cod has been frequently taken.

Of the fresh water food fishes of the region, ' Back's ' grayling,' an excellent species not prevalent elsewhere, seems to be found everywhere in its rivers, and even west of the Rocky mountains, but the staple product of its lakes and large rivers, seems to be whitefish, of great weight and excellent flavour, and trout, often reaching forty pounds in weight. The evidence goes to show that the farther north the greater the yield of fish till the quantity becomes enormous. As an illustration the following is given from the evidence of Prof. Macoun, who quotes Sir John Richardson, to the effect that one of the early overland Franklin expeditions took fifty thousand whitefish on a northeastern arm of Great Bear lake, and Sir John Richardson also states that the great lake trout swarm in all the northern great lakes.

In regard to the salmon fisheries, it would appear from the evidence that salmon are abundant in the rivers and along the coast of the northwest side of Hudson bay, as well as in the rivers of the northern shores of the continent. Your committee consider it advisable that means should be adopted to ascertain more accurately the extent and value of the salmon fisheries of these regions, with a view to utilizing them for the purposes of commerce, and for the revenue which they may afford.

The seas adjoining the great territory which your committee has had under investigation, are frequented by whales of different species, walruses, narwhals and a variety of seals. All these animals are valuable for their oil, but the large species of whales have heretofore been most sought for. Only a few years ago these animals had a much more extensive range than at the present time. Owing to improvements in navigation and methods of capture, they have, of late years, fallen an easier prey to their pursuers and have taken shelter in the less frequented seas of the northern coasts of Canada. Now they are being pursued to their last retreat by foreign whalers, and some species are threatened with complete extinction in a few years if this condition continues. It is to be borne in mind that whales are long-lived and slow breeding animals. The American whalers attack them with harpoons, explosive bombs and lances, fired from large swivel-guns carried on steam launches, instead of the old-fashioned weapons, thrown by hand, from row-boats. These methods not only destroy the whales with greater facility, but inspire the survivors with such terror that they seek the most distant and inaccessible parts of the northern seas, and have entirely disappeared from the waters in which they lived only a few years ago.

The Greenland, or harp seal, and the grey square flipper seal are common to the eastern coasts, while the present favourite whaling grounds of the New England whalers are Hudson bay, Fox channel, and Boothia bay. These animals are all found, with the walrus and porpoise, off the mouths and in the estuary of the Mackenzie, as well.

The chief present commercial produce of the country is its furs, which, as the region in question is the last great fur preserve of the world, are of very great present and prospective value, all the finer furs of commerce being there found, and the sales in London yearly amounting to several million of dollars.

MINERALS.

Of the mines of this vast region little is known of that part east of the Mackenzie river and north of Great Slave lake. Of the western affluents of the Mackenzie enough is known to show that on the head waters of the Peace, Liard and Peel rivers there are from 150,000 to 200,000 square miles which may be considered auriferous, while Canada possesses west of the Rocky mountains a metalliferous area, principally of gold-yielding rocks, thirteen hundred miles in length, with an average breadth of four to five hundred miles, giving an area far greater than that of the similar mining districts of the neighbouring republic.

In addition these auriferous deposits, gold has been found on the west shore of Hudson bay, and has been said to exist in certain portions of the barren grounds. Silver on the Upper Liard and Peace rivers, copper upon the Coppermine river, which may be connected with an eastern arm of Great Bear lake by a tramway of 40 miles, iron, graphite, ochre, brick and pottery clay, mica, gypsum, lime, and the petroleum area is so extensive as to justify the belief that eventually it will supply the larger part of this continent and be shipped from Churchill or some more northern Hudson bay port to England.

Salt and sulphur deposits are less extensive, but the former is found in crystals equal in purity to the best rock salt and in highly saline springs, while the latter is found in the form of pyrites, and the fact that these petroleum and salt deposits occur mainly near the line of division between deep water navigation and that fitted for lighter craft, give them a possible great commercial value. The extensive coal and lignite deposits of the lower Mackenzie and elsewhere will be found to be of great value when the question of reducing its iron ores and the transportation of the products of this vast region have been solved by steam sea-going or lighter river craft.

CLIMATE.

The prevalent southwest summer winds of the country in question bring the warmth and moisture which render possible the far northern cereal growth, and sensibly affect the climate of the region under consideration as far north as the Arctic circle, and as far east as the eastern rim of the Mackenzie basin.

MEANS OF COMMUNICATION.

The extent of the scope of the inquiry covers one million two hundred and sixty thousand square statutory miles, which area includes none of the islands of the Arctic archipelago. Its coast line on the Arctic ocean and Hudson bay measures about 5,000 miles, which estimate does not include the coast lines of inlets or deeply indented bays.

Over one-half of this coast line is easily accessible to whaling and sealing crafts.

The navigable coast lines of the larger lakes of the region in question amount to about 4,000 miles, while its total lacustrine area probably exceeds that of the eastern Canadian-American chain of great lakes.

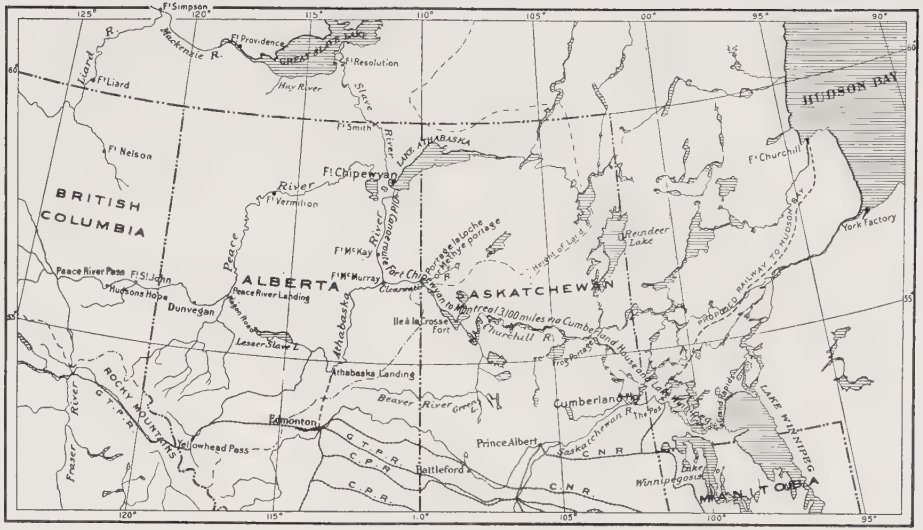
There is a river navigation of about 2,750 miles, of which 1,390 miles is suitable for stern-wheel steamers, which with their barges may carry three hundred tons; the remaining 1,360 miles being deep enough for light draught sea-going steamers.

There is a total of about 6,500 miles, of continuous lake coast and river navigation, broken only in two places.

The two breaks in question are upon the Great Slave and Athabaska rivers, the first being now overcome by a 20-mile waggon road from Fort Smith southwards on the Great Slave river, and the latter being a stretch of 70 miles on the Athabaska, of questionable navigation above Fort McMurray, down which flat boats or scows descend, but cannot ascend, and which about 50 miles of waggon road would overcome, while some improvement of the rapids might render the whole river navigable.

With suitable steam crafts this river and lake navigation may be connected with Victoria and Vancouver by way of the mouth of the Mackenzie, the Arctic ocean and Behring straits and sea, and it is now connected on the south by 90 miles of waggon road, between Athabaska Landing and Edmonton, with navigable water in the Saskatchewan river.

All the evidence has agreed as to the great extent of unbroken navigation, and this fact has been of great use to the Hudson Bay Company, who have always used the waterways, even when circuitous and difficult, rather than resort to land carriage; and their inland posts to as far north as the Arctic circle, are now supplied from their



Map showing part of the Old Canoe route from Montreal to Chipewyan on Lake Athabaska.

central depot at Fort Garry with only 114 miles of land carriage, four of this being by tramway at the Grand Rapids of the Saskatchewan, ninety miles of waggon transport from Edmonton to Athabaska Landing, thence by steamer and flatboat to Fort Smith on the Great Slave river, where twenty miles of waggon road connects the shallow with deep water navigation, and the steamer 'Wrigley' distributes them to the various posts down to the mouth of the Mackenzie, just above its estuary, where the river is said to be six miles wide, and up Peel river, which joins the Mackenzie near that point to Fort Macpherson, on that gold-bearing stream. The great lakes which receive the drainage of this vast region and give an equal flow to the Mackenzie, all have deep water navigation, and like most lakes of the Laurentian formation, are studded with islands.

The most southern source of the Great Mackenzie river is a stream fed by the glaciers of Mounts Hooker and Brown, two of the highest of the Rocky mountain chain, in latitude 52° 30′, and this soon becomes a navigable stream, preserving that character except at the breaks mentioned, during the nearly 2,500 miles of its course to the Polar sea. As already mentioned, these western affluents will form valuable links as a means of taking in machinery and mining supplies to the upper waters of the Peace and Liard rivers, which are now inaccessible for heavy machinery from the west coast. And the cost of taking in provisions, makes in mining and prospecting efforts a serious desideratum. The navigation upon the Liard river also will be an important factor in the future food supply to the great mining region of the upper Yukon and Peel rivers.

A reference to the valuable evidence obtained by your committee will show that navigation from Behring straits to the mouth of the Mackenzie, and probably as far east as Wollaston Land, may be had for three months in each year, the soundings given on the admiralty chart, of that portion of the Arctic sea revealing an average depth of about two hundred fathoms, which is a considerable depth in what is known to be generally a shallow sea. The western branch of the estuary of the Mackenzie is said to be the outlet which has the deepest waters and it is respectfully submitted that much good might accrue were the Dominion Government party now working its way from the Yukon towards Peel river and the Mackenzie, to descend either of these streams and examine the western and other branches of the estuary of the Mackenzie.

To convey an idea of the distances which separate the navigable waters of the Mackenzie basin from the eastern and western sea coasts and from navigable rivers and railways to the south and southeast the following table of distances has been taken from the evidence. The lengths are in straight lines as follows:—

From the head of Great Slave lake to head of Chesterfield inlet, 320 miles; from the head of Athabaska lake to the harbour of Churchill, 440 miles; from Fort McMurray at the junction of the Clearwater with the Athabaska, below the 70 miles of questionable navigation, to the following places on the Saskatchewan: Prince Albert, 300 miles; Fort Pitt, 220 miles; Victoria, 179 miles; Edmonton, 225 miles. From Calgary, on the Canadian Pacific Railway, to Athabaska Landing, on the Athabaska river, 65 miles; from Hazleton, on the Skeena river, to Peace river, in the Pass, 150 miles; from Fort Mumford on the Stikeen river to Fort Liard, on the Liard river, 370 miles.

THE EVIDENCE.

Both oral and written evidence was taken by the committee. As many witnesses as could be conveniently summoned were examined personally, in the committee room, while a schedule of questions was submitted to a large number of explorers, settlers, missionaries, Hudson Bay Company officials and others living at a distance.

In the following 8 pages all evidence likely to be of any value at the present day is given substantially as it was submitted to the committee in 1888. Obvious repeti-

tions have been eliminated, the evidence has been arranged under a schedule of subjects and transposed from the form of question and answer into that of a running narrative.

EVIDENCE OF JAMES ANDERSON, ESQ.

Mr. James Anderson, at the time of his examination a resident of Winnipeg, explained that he was born in the Lake Superior district, but went up to Fort Simpson with his father in 1852. When he left the Mackenzie river district he was 11 years old, and he remembered what he saw growing at Fort Simpson, and what he saw in travelling with his father. Witness explained that his father was appointed by the home government in 1855 to go in search of Sir John Franklin, in charge of a party with a Mr. Stuart, a chief trader of the Hudson Bay Company, as an assistant of his. Witness produced the diary his father kept of that trip, and explained that he found very valuable information all through it with regard to the different growths and the different plants of that region, which he observed on the trip. He finds that his father went up the Mackenzie river from Fort Simpson until he struck Great Slave lake, and from there went to Fort Resolution, and from Fort Resolution he went down the Fish river, known as Back river, to the sea coast. He had two canoes and 12 or 15 men, and witness found in different parts of the diary that his father mentioned such things as that on 5th June, 1855, at Great Slave lake, gooseberries were in blossom, and on June 7, that strawberries were in flower on Big island.

AGRICULTURE.

Witness remembered seeing potatoes, turnips and barley growing at Fort Simpson. Annually there was a York boat loaded with potatoes sent to Fort Good Hope—that is 400 miles farther north, so that they could not have grown potatoes there then. The potatoes grown at Fort Simpson, which is about latitude 62, were the ordinary size, about the same as in other parts of Canada, quite as large as grown in Ontario and just as good quality.

There was a farm at the Fort which produced very good native grass. The cattle pastured all the summer. Cows and oxen were the only farm animals. No horses or sheep. As far as witness remembered, vegetation at Fort Simpson was quite as early in the spring, as in Ontario.

As to native fruit he recollected often having eaten the strawberry and gooseberry there, and the high bush cranberry also grew at Fort Simpson. They used to pick the berries of this tree in the winter.

He had heard that crops were raised all through the Churchill valley. The Indians raised stuff there at Norway House, for instance.

FORESTRY.

Witness remembered that the timber growing about Fort Simpson was very large. It was fir, poplar and birch. He thought that the fir was perhaps hemlock or the Norway spruce. He did not remember particularly. He knew it was a very large kind. He remembered that the men in the winter used to square the timber for building purposes. They used to build their houses of the timber squared; the fort itself was built of squared timber, and the trees were very large. He thought the timber was squared to about a foot square. They would probably not select the largest trees for the buildings.

FISHERIES, FUR AND GAME.

Every kind of fur was procured at Fort Simpson—the silver fox, beaver, marten, lynx, foxes of all kinds, fisher, otter, mink, rabbit, black bear. There were muskrats,

but the company did not bother with their skins at that time. As for game animals, numbers of moose were killed, and rabbits.

In the way of game birds, there were grey and white partridges, and any quantity of geese and ducks of all kinds. In the spring and autumn they passed over Fort Simpson so thickly that there was no difficulty killing any quantity.

The only fish he could remember being caught in the river at Fort Simpson was the la loche or ling. It has no scales and is like the eel. The flesh is not considered very good. They give it to the dogs and eat the liver. They weigh about ten pounds. In the lakes about whitefish and trout were caught. There was splendid fish of all kinds in Slave lake.

CLIMATE.

The ice generally moved out of the river in the middle of May. In the winter there would be two feet of snow on the level. In midwinter there were only two or three hours of day-light each day at Fort Simpson, and in summer you could hardly tell the difference between day and night. The long continuous daylight must have had a wonderful effect upon vegetation. The water in the Mackenzie river was not very cold in the summer. Witness had often bathed in it, himself, with his father.

SETTLEMENTS.

Fort Simpson was the headquarters of the Hudson Bay Company for the district, the company's best district at that time. The force at the Fort was about 50 or 60 people, principally half-breeds and a few Orkney men.

The witness agreed to consult with Dr. Dawson and others interested in the investigation, and to come to a later meeting prepared to read extracts from his father's journals, letters and other papers, throwing light on the subject under discussion.

EXTRACTS FROM DIARIES.

April 9, 1888, Mr. Anderson read a number of notes from his father's diaries before the committee. The salient points were as follows:—

Mr. Anderson, senior, when in search of Sir John Franklin in 1855, left Fort Simpson on May 28. The river was open, but ice drifting in the Upper Mackenzie. May 30, birches and poplars begin to put on their leaves.

June 4.—Vegetation has made rapid advances the last few days.

June 6.—Gooseberries in flower; weather very warm.

June 7.—Strawberries in flower; grasshoppers seen.

June 13.—Cowslips in flower (cattha palustris) same date, near Fort Resolution (that is somewhere in the neighbourhood of latitude 61 degrees or 62); grass 18 inches high, and birches leafing.

June 19.—Camped near the sulphur springs, west of Fort Resolution. As he proceeded up the lake he found the ice more solid.

June 28.—Trap rocks looking exceedingly like those on Nipegon bay. Many plants are now in flower (latitude 62 degrees or 63).

July 2.—Left the lake at this date and still found the ice very solid in places. He again speaks of the islands looking like those in Nipegon bay.

July 5.—Traces of marmots seen. Came on barren ground.

July 6.—A marmot seen; ice still seen; disappearance of trees. Lake fishes, with fine salmon trout. Trees only 2 feet high.

July 8.—Sandstone on Lake Aylmer fit for the finest grindstone.

July 11.—Country around Lake Aylmer almost destitute of animal life.

July 15.—Saw caribou and musk ox. Shot one (that would be about latitude 68).

July 16.—Grey wavies seen in numbers, moulting. Large numbers were killed with sticks, as the birds were unable to fly.

July 17.—Noticed that the weather was much warmer after leaving Lake Beachy (latitude 68 or 69). Capt. Black accounts for it by being farther from the sea. Great numbers of Canada geese moulting. Canada geese were very common everywhere.

August 20.—Canada geese and deer moving southward.

August 22.—Crow berries, eaten by wild geese, ripe.

September 10.—Wood increasing as approached Slave lake. Birch the size of axe-handles. A whiskey-jack seen.

FROM OTHER DIARIES.

The following extracts were from a diary of 1850:—

September 19.—Isle a la Crosse to Athabaska. Sulphur Springs, game abundant. (It would be latitude 59, longitude 110 west). Pines mentioned. Near Athabaska Forks, Bois Blanc is found here. That is a kind of white wood. White cranes, geese and ducks in great numbers. The Athabaska is a noble river, low water, lots of sand banks.

September 20.—Lime, iron and sandstone. Sand dyed black by bitumen or naptha, which oozes out continually. Naptha springs. Poplars and epinettes (the black spruce) on this river, are very large.

September 22.—Timber of great size. Wavies (that is the white goose) here in thousands. Fort Simpson (about latitude 65) to Fort Good Hope, Mackenzie river (latitude 67).

The following were from a diary of 1852:—

May 21.—Left Fort Simpson for Fort Good Hope. Poplar and birch in bud.

May 24.—Arrived at New Fort Norman (about lat. 65). River broke up at Fort Norman and Fort Good Hope (lat. 67) on May 9. Ice from the ramparts came down on the 21st.

June 6.—Saw dragon flies.

June 7.—Roses in bloom at Naphannie river (latitude 63) rapids at Fort Simpson, a short distance above the fort; lots of fish about the rapids.

June 22.—Mineral coal at the Boucane on the right of the river, between Fort Good Hope and Fort Norman, which is burning. There is more on the left, half way between Old and New Fort Norman.

July 11.—Camped at the Tar Springs, Athabaska river.

July 14.—Camped about six hours, below Sulphur springs.

July 16.—Much disturbed with heat (latitude 58).

The following were extracts from various journals and letters of the elder Mr. Anderson, in the possession of his son, the witness:—

September 12, 1850.—Isle a la Crosse, they raise wheat, potatoes, &c.

July 14, 1853.—Athabaska to Portage la Loche. Camped at White Earth Portage. There is a sort of white earth there which I suppose could be used as a sort of paint.

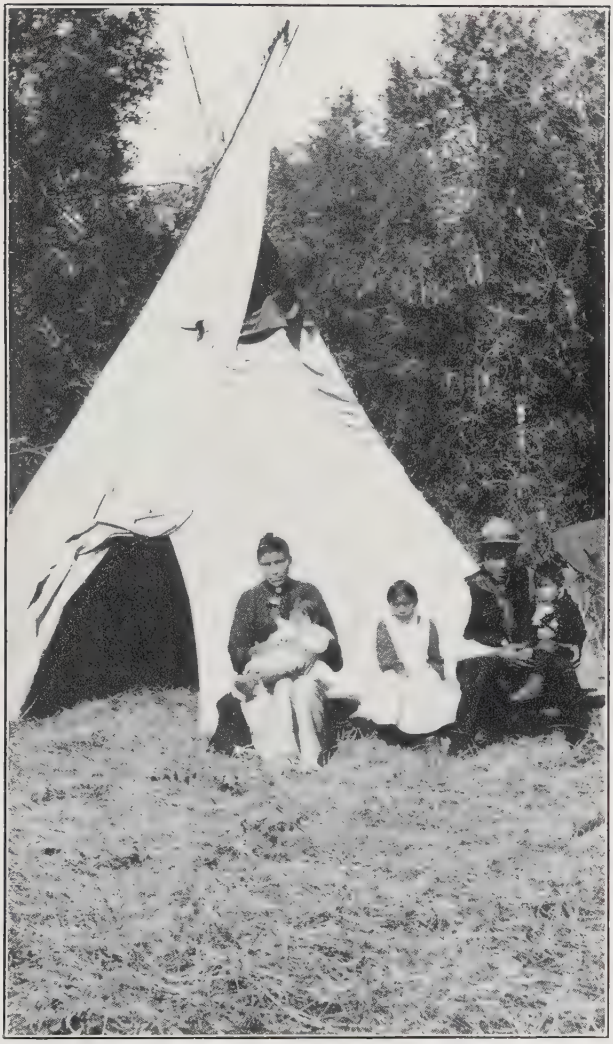
May 22, 1856.—Mentions on his way to Fort Liard on the Liard river, that on one part of the river it cuts its way through a mountainous sandstone. The banks are absolutely perpendicular. A bad year for furs at Fort Liard (latitude 59), owing to the total absence of snow.

Fort Simpson, May 30, 1856.—Saw the first flower. (Letter to Bishop Anderson, Red River Settlement).

July, 1856—Good barley and extra potatoes in large quantities. Climate very mild.

A letter to Sir George Simpson, of March 25, 1857, 'I find that the deer hunting and trapping were bad at Fort Liard and Fort Halkett, because of there being no snow.'

Mr. McPherson, under date July 26, 1847, states that the trade at Forts Norman and Good Hope had suffered much on account of the Mountain Indians resorting to Francis lake and Pelley banks.



An Indian Family, Smoky River.

October 5, 1857.—The Mackenzie river was open and the Liard river was still open October 5, 1857. The record does not say when it closed; it merely says, 'boats go up.'

May 27, 1858.—Calm and warm. Between Fort Simpson and Fort Good Hope, mosquitoes. Arrived at Fort Good Hope, May 30. Met Esquimaux from Anderson river. Salt on Great Slave lake, 20 kegs. Salt, 12 bags near the portage, Great Slave river.

EVIDENCE OF MALCOLM MACLEOD, Q.C.

Ex-Judge Malcolm MacLeod, Q.C., at the time of his examination, residing at Aylmer, Que., explained that he was born in the Northwest at Green lake, in a sub-Arctic region called the English river district. He was young (in his tenth year) when he left the country, still he had sufficient personal recollection of it, from the foot of the Rocky mountains to Hudson bay, to be able to give some evidence as to its physical features, its agricultural capabilities, its food resources and general character. Beyond that—the Mackenzie region proper (Green lake is on the verge of the Mackenzie river basin) he had only documentary evidence furnished by a synoptical report of official letters to his father when in charge of Norway House, between 1826 and 1830. Norway House was the centre until a few years prior to 1888, of the Hudson bay territories for the working of the company's system. Their brigades used to meet there every year from all quarters—from the Arctic to the Pacific and from the Pacific to Hudson bay, the council was held there and the affairs of the territories were all administered from there. Witness's father was in charge and these letters came to him officially, and also from every post annually, privately. In all of those letters the food question was a vital one, and every letter touched on the subject. At many of the posts it was a very vital question, but witness noticed in all of them the food resources of the country were discussed—say the food capability of the place, the staple supplies, whether deer, hares, fish, &c. These letters witness produced. He explained that these documents were not written with any object to deceive. The writers were all parties entirely within the company, and in the full confidence of the company. He therefore submitted them as really a truthful representation of the food resources of the whole country which they covered. Amongst the contributors to that information, witness found all the Arctic explorers, from Franklin to the days of Sir George Simpson, all the chief officers of the chief posts, and (very interesting too), of the original explorers of the country between the Mackenzie river and Yukon. That country was first explored by a namesake of witness' father, John McLeod, jun., whose followers called the country a 'land of milk and honey.' There were some of his letters that gave an account of the country. Amongst them also he found other names with reference to the explorations of that region, particularly those of John Stuart, after whom Stuart's lake in the northern part of British Columbia was named. There were several letters of his on that subject, because he was stationed at Fort Simpson a considerable time and was familiar with all that northern region. Mr. Stuart spoke of Fort Simpson, the region about there, the extent of it and this then new country between the Mackenzie river and the Yukon. He was one of the party who ran the Mackenzie river with Simon Fraser originally. That wonderful feat was accomplished by Simon Fraser, Mackenzie, Stuart, Faris and Quesnelle. Witness knew all the parties intimately except Fraser; and as for Stuart, like all others there, his word was to be taken certainly as perfect evidence on the subjects with which he dealt. The witness explained that his late father, from 1811 till his death in 1849, when still in active service, was in constant and familiar correspondence with his associates in the fur trade from all quarters of the vast territory covered by their enterprise. What was said in these letters on the subject of the natural resources of the country was in utmost truth, and in fullest and familiar confidence. Such evidence he thought was beyond cavil.

Mr. MacLeod proceeded to state incidentally, that seventeen years previously he wrote a book called 'Peace River,' on the documentary evidence in hand, and specially based on the journal of a canoe voyage by Sir George Simpson from the shores of Hudson bay to the Pacific. He kept a journal of the trip in very full details, and it was exceedingly valuable. In giving information of the Northwest to Mr. Sanford Fleming (now Sir Sanford Fleming), at the time he was gathering data for the Pacific Railway project, the witness happened to lay these journals, amongst other papers, before him with hand maps, and especially the map of the Gorge of the Fraser; and Mr. Fleming read it over to witness and suggested that it would be very valuable at that time that it should be published. Witness did publish it in April, 1872, and distributed it in Canada, England and elsewhere. It was the first time that that was done.

Witness was examined before the Immigration and Colonization Committee of the House of Commons in 1876 on the Northwest question, and before that he had published a statement in Lovell's Gazetteer of British North America, mapping out the wheat areas and the areas not adapted to wheat growing, but known to be fit for barley and potatoes, and those fitted for pastoral purposes.

AGRICULTURE.

As to the particular subject of wheat, witness was enabled to say what was a wheat area and what was not in this way. Those who had lived in the Northwest would be familiar with the berries that grow there. The service berry, for instance, is the staple berry for food, and it is largely used in the manufacture of pemmican. The maternal grandfather of the witness (Chief Factor John Peter Pruden) was in charge of Fort Carlton for some years—in fact he built Fort Carlton, and the principal business of Fort Carlton was to collect pemmican and food supplies from the Indians for the brigade service of the territories. He, there, to supplement his food, obtained from the Indians, went into gardening; and a splendid kitchen garden he had. He raised everything we do in eastern Canada, except Indian corn, without difficulty, and even Indian corn he raised with special care; and this fact became familiar throughout the west, that wherever the service berry would grow, wheat would grow. An uncle of witness, Chief Factor Herrot, had taken samples of wheat up to the foot of the Rocky mountains, and took the first wheat to Fort Assiniboine, a very bleak region on the spur of the mountains. He was afraid at the time that it would not succeed there, but it did succeed, and has succeeded ever since. In that way Northwest people came to know certain facts regarding the vegetation and the agricultural resources of the country, and this important fact, that wherever these service berries ('sasscootum'), or shad berries as they are called in the United States, grow, wheat can be grown, and witness appealed to Prof. Macoun, who was present, to ask if he had not found that to be so.

Prof. Macoun replied: 'Yes, it is actually so.'

The witness, continuing, said it was known that the Peace region abounded with the service berry. No one had tried wheat there at that time, however—not when witness was in the country. But through the reports of Sir John Richardson, he concluded that wheat would grow there. Richardson had written sufficient to indicate that there might be that degree of fertility in that region, but the fact was never put forth by the Hudson Bay Company in any way to attract public attention.

It had since been confirmed and proved, that all that region was, witness might say, almost half torrid. The Peace river district proper was the region of the cactus.

The reports witness had showed that this fertility extended throughout the whole valley on the west side of Mackenzie river. It was proved by the experiments made at the different posts, but of course this fertility diminishes according as one approached the Arctic circle until nothing can be raised within it but turnips and potatoes.

Witness had a very interesting letter, from Mr. Thomas Simpson, the Arctic explorer, to his (witness') father, dated from Fort Confidence. Fort Confidence was at the time this evidence was given, the most northerly habitation on this continent that

was inhabited by white men. It was within the Arctic circle (67 degrees 53 minutes and 36 seconds). It was beyond Franklin's outpost. Of course Franklin's expedition went further north. Simpson (with Dease) went over Franklin's ground and beyond it. There was a hiatus on the east and on the west, and this expedition of Dease and Simpson filled that up. And Simpson not only gave it the name, but he erected the fort. This was in 1837. Fort Franklin was the most northerly post in Franklin's expedition.

FISHERIES, FUR AND GAME.

Simpson spoke of the food resources of Fort Confidence as being abundant. The distances between posts were so great that even Dease and Simpson's, which was a Hudson Bay expedition thoroughly equipped, could only carry food barely sufficient for use on the way, and they were there three winters, those of '36-37, '37-38, and '38-39, nearly three years, and they never failed a single day to have an abundant supply of food. Franklin suffered more, because his party was not so well equipped at times; but it is a striking fact that, notwithstanding the severity of the climate, especially in 1838, when the letter was written—an exceptionally severe season—they never ran short of food. They had abundance of fish, deer, musk ox and meat of other kinds at all times.

EVIDENCE OF PROFESSOR WILLIAM SAUNDERS, DIRECTOR OF THE CENTRAL EXPERIMENTAL FARM, OTTAWA.

Professor Saunders was examined with regard to the work of his branch of the Department of Agriculture, then in its infancy, of introducing varieties of grain grown in northern Europe to the northwestern part of Canada.

The witness produced some samples of Ladoga wheat grown in Russia in 1887 and in 1888; also samples of this wheat which had been grown at the Touchwood Hills reserve, N.W.T., at Edmonton, N.W.T., and at Binscarth, Man. The Ladoga wheats, he explained, all came from latitude 60 in northern Russia, near Lake Ladoga, north of St. Petersburg. Witness also produced samples of Onega wheat from latitude 62, farther in the interior; Onega oats from the same latitude in northern Russia; Petchora barley from latitude 66, northern Russia, near Petchora river, up close to the Arctic ocean; Polar barley from latitude 67, within the Arctic circle, east and north of Archangel; Polar winter rye from the same latitude, and two samples of Danish barley from the Royal Agricultural Society of Copenhagen, Denmark. One of these was of the variety known as the Danish Chevalier barley and the other as Danish Prentice barley. The weights of these different grains were as follows:—

	Lbs.
Ladoga importation of 1887, weight	61½
" " 1888, "	62
Wheat from Donald Ross, of Edmonton, weight	61½
" Touchwood Hills, weight	64
" R. W. Smellie, Binscarth, weight	65
Onega wheat, weight	58¼
Onega oats, weight	37
Petchora barley	49
Polar barley	47
Polar rye	55½

The vitality of those seeds, as far as the tests were completed, was given by the witness as follows:—

	Per cent.
Ladoga, 1887	98
" 1888	100
Onega wheat	99
" oats	96
Petchora barley	95
Polar barley	95
" rye	93

These tests indicated a great degree of vitality in the grain. The samples of Petchora barley, Polar barley and Polar rye had been obtained from the extreme northern limits of grain growing in Europe.

GRAIN GROWING IN NORTHERN EUROPE.

Witness explained that the Polar rye and Polar barley came from within the Arctic circle, latitude 67°. The Petchora barley came from latitude 66°, which is close to the Arctic circle. The Onega wheat came from about latitude 62°, farther down from the sea and more in the interior, and the Onega oats from the same district. Witness could not tell exactly what the summer isotherm of that most northern wheat area was. His Russian correspondent states that the winter rye is sown in July of one year and reaped in August of the following year, but he had not given the length of the summer. It was a long distance from the point where his correspondent lived, up to the point of growth—400 or 500 miles—and as there was no railway communication, it took a long time to get the grain down from there—generally two or three months from the time it was ordered before it could be got to Riga.

As to the conditions that would be necessary to produce wheat in the region north of the Saskatchewan watershed, witness explained that it was generally held that it required a certain definite sum total of heat to ripen wheat. What that is he could not give from memory, but there is a limit, and if you pass that limit it ceases to be able to produce wheat. As far as he could learn from his correspondent in Russia, in latitude 62, where the department got this Onega wheat, it is about the northern limit of wheat growing in Russia.

Prof. Saunders pointed out that there is another factor besides heat, which is held by many scientific men to be of very great importance, and that is, the amount of light. Of course, as you approach the Polar regions in the summer season, you have almost continuous light.

It had been pretty well established that light has a decided effect on the growth of cereals, but what exact value is to be attached to that factor in the estimate, had not yet been determined. It would require many years of careful consideration before it would be possible to say how much additional light would make up for a small deficiency in heat; but that it does so to a certain extent had been pretty well established.

EVIDENCE OF PROFESSOR J. MACOUN, BOTANIST TO THE GEOLOGICAL SURVEY OF CANADA.

Prof. John Macoun, in these examinations, gave a considerable amount of information, all valuable at the time, and much of it still, as to the character of the Peace river, from Fort MacLeod in lat. 55, to Lake Athabaska, up the Athabaska to the Clearwater, and up the Clearwater to its head.

Witness explained that the Peace river proper does not enter Lake Athabaska, but a large river about 100 yards wide or more, called the Quatre Fourches, connecting with the Peace river, does. In the spring of the year, when the Peace is high, the water runs out of it via the Quatre Fourches into Lake Athabaska, but when the water is low the flow is from Lake Athabaska, via the Grand Fourches into the Peace river. There would be no difficulty in a steamboat passing from the Peace to Lake Athabaska via the Quatre Fourches. The real mouth of the Peace is about twenty-five miles below, where it falls into the Slave river. For 200 miles from its mouth the Peace is a mighty river, 1,000 yards wide, with no bars.

AGRICULTURE.

As to the Peace river country, starting from the Parsnip and through the Rocky mountains, the good country for agriculture commences at the Rocky mountains portage at Hudson's Hope, or the Hope of Hudson, as Capt. Butler puts it. From that point down the country is suitable for agricultural purposes, the whole distance; on the prairie, not on the slopes of the river, but on the prairie above. There are no mountains there at all to be seen after you get up the bank. It is a fine prairie country, just a level prairie all the way, only there is an abrupt ascent, as geologists say, going from one class of rock to another.

The North bank of the river, that is the one facing south, has hardly any wood, but is covered with berries, and witness found the cactus growing there. The other side of the river, facing the north, was covered largely with spruce down to the river's edge, the whole upward slope. It was only the banks of the river that were wooded; above, all was prairie, with poplar and willow in clumps. It was of the same character as the North Saskatchewan, but with much taller grass. There were ledges of limestone rock that crossed the river from bank to bank at the first obstruction, at Little Red river. They estimated the river to be a mile and a half wide there.

Said Prof. Macoun:—'While at Fort Vermilion, on Peace river, in lat. 58° 24', I was informed by old Mr. Shaw, who had charge of that post for fifteen years, that Indian corn would ripen well every year there, and at Battle river corn ripened three years in succession, and that frost never injured anything on this part of the river. The whole country at Fort Vermillion is a plain, not elevated at its highest point more than a hundred feet over the river, but the greater part of it is less than fifty feet. The soil is wonderfully like that of the second prairie steppe, in the prairie region, as the surface is composed of black loam, mixed apparently with limestone gravel. From Vermillion the Caribou mountains are visible about forty miles off. These may have the effect of keeping off the cold winds from Great Slave lake, and hence the country is permanently warm. Both days and nights have been warm down on this part of the river, whereas on the upper parts, where high banks are, the cold was even felt at night in August.

GRAIN AT FORT VERMILION.

'The grain at Fort Vermilion was sown on May 8 and 20, and was cut on August 6. Wheat growing among the barley and by the fences was almost ripe August 12, when I was there. At the Rocky Mountain portage, where the Peace river issues from the Rocky mountains, latitude 56 degrees, we found a first rate garden with vegetables far advanced, July 21; new potatoes, onions, and carrots were part of our bill of fare. That was in 1875. Five days later, at St. John's, vegetation was even further advanced, and all kinds of garden stuff were in the greatest perfection. Nigger Dan's barley was colouring on July 26, and would be cut the first week in August. His potatoes were large, and enough for fourteen men were dug on August 2.

'I may mention that strawberries were fully ripe on July 6, at Hudson's Hope. At Dunvegan barley was almost fit to cut August 4. Cabbage in the priest's garden were closing, and all his garden vegetables far advanced.

'At Battle river pease were getting ripe August 8. At Vermilion potatoes were very large, and many heads of barley contained sixty grains, others many more. I never saw such fine barley before. Barley was sown on May 8 and cut on August 6—that is at latitude 58° 24'. At Red river (a small fort, 50 or 60 miles below Vermilion), they have no ploughs, and the ground was broken up with a spade or hoe. The garden stuff was wonderfully luxuriant—pease, Windsor beans and potatoes far advanced; cucumbers started and raised in the open air, a very large crop, and a number of them were ripe on August 14.

'At Fort Chippewyan Mission, two miles from the fort, there were wheat, oats and barley, a good crop as regards grain. Windsor beans were ripe and pulled up on August 17. Wheat and barley were in stock August 26, and specimens of these, which I brought to Ottawa, are here on the table.

ABOUT A CROP OF CUCUMBERS.

'At Red River fort a Frenchman named St. Cyr had a garden, and he told me he had a particular thing growing in the garden that he did not know anything about. I went out to look at it, and there was a splendid patch of cucumbers, many of them ripe. That was in August. I said: "These are cucumbers; how did you start them?" He said: "I got the seed from England and put it in the ground, and that is what has come from it."

'I passed down the Athabaska (from Fort Chippewyan) to the Mission, and I found growing on soil that would be of no value here whatever, sand and muck, an old swamp where they had planted wheat on May 5, and I found it in the stook on August 26, and brought away from it the grain that was awarded the bronze medal at Philadelphia, in 1876. It was forwarded to me, but I said that it did not belong to me, but to the missionaries at Athabaska. I exhibited this very lot of grain in Manitoba before Consul Taylor and many other gentlemen, and the matter of the number of grains in the fascicle was then discussed and made public. They took a quantity of the wheat from me and shelled it, and Mr. Gouin, Inspector of Inland Revenue, weighed it, and it showed a weight of 68 lbs. to the bushel.

'Barley ripens at Fort Simpson, latitude 62°, every year between August 12 and 20.

'Barley and potatoes have been grown at Fort Norman at the mouth of Great Bear Lake river, about lat. 65°, and even at Fort Yukon, in the Arctic circle, barley is a sure crop. These are not particular points noted for their good soil, but located solely for the fur trade. Five-sixths of the country is just as good as these points, and will in future produce as good crops. There is no point east of the Mackenzie suitable for agriculture.'

'I was informed by Chief Factor Hardisty, brother to Senator Hardisty, who had charge of the Mackenzie river district for many years, that wheat was a sure crop at Fort Simpson four times out of five, but that the country around Fort Liard, on the Liard river, was much superior to Fort Simpson for agricultural purposes. All kinds of garden produce succeed well; and melons, after being started in a hot bed, ripen well.

MACKENZIE VALLEY' SOIL.

'The Mackenzie valley and the whole of the northern prairie country has a soil that is largely composed of what is called alluvium; and as we pass northwards further down the Peace river to the Mackenzie the surface, from all I can gather from what I have read is precisely the same character as the second prairie steppe, which is the surface soil of black mould mixed with limestone gravel, and when you go deeper down there is more gravel and sand in the subsoil. Ten years ago it was said that all our prairie was gravel and sand. Why? Because the first explorers saw the badger holes the subsoil from which was gravel, and they said it was the natural soil of

the country. Many people speak of the soil of the Mackenzie river from just such cursory observations; but the whole of the country from Edmonton northwesterly to the Arctic ocean in the Mackenzie valley is underlaid by Devonian or cretaceous rock, and by the disintegration of these rocks good soil is produced always. From everything I can gather, the whole region out to the Arctic coast, west of the Mackenzie river has a good soil. Easterly we strike a land of barrenness naturally. The line of the Mackenzie is not exactly the line. Our geologists know that there is a portion of the valley east of the river and up to the base of the Laurentian rocks where the land seems to be good—I mean as regards the soil.'

NORTHERN PRODUCTIVENESS.

'The nearer grain grows towards its extreme northern limit of production, the larger will be the yield. I can prove it in two minutes. I had the honour, when in England, two years ago, of reading a paper before the Royal Geographical Society of England, and at that time I took upon myself to speak of our Northwest and its productions. I took in my hand heads of wheat grown in Kent and Surrey. I have now in my hands heads of wheat and barley grown at Dunvegan in latitude 56, brought here by Dr. Dawson in 1879. Anyone examining these heads will see that the fascicles contain from four to five grains—an average of 4½ grains to the fascicle. Had I heads of wheat grown at Ottawa, I would show you that the fascicles contain 2 and 3 grains. When I was on the Peace river in 1875, I got wheat at Lake Athabaska that contained 5 or 6 grains to the fascicle, and I turned to the English gentlemen, and I said: "I can prove by comparison the wonderful productiveness of the Canadian Northwest."

'If the farmers of Ontario, with their two and three grains to the fascicle can produce 25 bushels of wheat to the acre, under the same conditions the men of Manitoba will produce 35 to 40 bushels to the acre, and those of Peace river will run up above 40, and those further north still more, granted that the same acre produced the same number of stalks. It is a known fact that all fruits and grains produce more abundantly as they approach their northern limit, and it is a known fact likewise, that the human species, as well as the lower animals, are more fruitful in the north than they are to the south. So that taking it as a whole, it can be easily seen how to account, without any stretch of imagination, for the wonderful output of wheat from Manitoba last year.

'Central Asia was the home of the race. It is where we get all our grains and fruits and men of any power; and we in Canada have got a plateau of the same character, and on that plateau, perhaps after I am dead, but I trust before, we will be raising all manner of produce of the very highest quality and in immense abundance, because the prolific power becomes greater as we pass towards the line of extinction. That is the law. That is to say, where the cold becomes so great that it will not produce leaves or anything else, the plant aims to produce its kind.

THE NATIVE GRASSES.

'As to the natural grasses of this country, having just completed an examination of the whole grasses of the Dominion, I am safe in stating that they are the grasses best suited for pasturage of any known to stock men or farmers. The grasses referred to are those known as red-top and Kentucky blue grass, or scientifically, *Poa Pratensis* and *Poa Seratna, Poa Tenniflora* and *Ceasia.* These four species are well known to American stock men and are considered of the highest value. They are the commonest of the grasses in our northern forest region and along the foot hills of the Rocky mountains. Three of these species are known in the eastern provinces. One of them is exclusively western and the greater part of the common pasturage of Ontario is altogether composed of *Poa pretensis* (Kentucky blue grass, or red-top).

'The wild pea or vetch grows all through the Peace river valley, but was particularly noticed on the plateau above Fort St. John in latitude 56. Here it was actually measured by myself and was found to attain a height of eight feet, while the weeds, such as the purple fire weed of the east (*Epllobium Augustifolium*) attained a height of seven feet. These are given in illustration of the wonderful luxuriance of the commoner plants on that high plateau. The vegetation throughout the whole Peace river valley is of the most luxuriant character, and it seems more like that of the tropics than a country drawing near the Arctic circle.

DOMESTIC ANIMALS.

Prof. Macoun said he was decidedly of opinion that domesticated animals would in the future be raised in the Mackenzie basin. Sheep, horses, pigs and cattle can and will be raised there. It is a law of nature that they cannot fatten cattle in southern Texas because it is not cold enough to solidify the fat, as it were, and they have to drive the Texan cattle north to fatten them. Every animal, as you go north, produces more fat, and is easier fattened, because it is a law of nature that fat should be laid up.

FISHERIES.

The whitefish, *Coregonus Albus,* is truly the wealth of the northern Indians. From the Arctic sea it abounds in all lakes of any size and many rivers with clear water. Everyone relishes it, and travellers can eat it as their staple food for months and not tire of it.

The great lake trout is found in all the great lakes of the Arctic regions.

The whole Laurentian district north of Lake Athabaska is full of lakes which teem with the finest fish of the best quality.

Witness had caught Back's grayling *salmo signifie* in the tributaries of the Peace river, in the Rocky mountains. It is both an Arctic and a mountain fish ,and delights in clear water. It is very gamesome and takes all kinds of bait. When it took the bait it would jump clear out of the water, many times a couple of feet or so, and of course, the beautiful colours (more beautiful than those of the mackerel even), glistening in the sun, made the anglers thrill with excitement. They are a white fleshed fish, and not anything like as hard as the trout.

FORESTRY.

There is an abundance of timber in the vicinity of Fort Chippewyan on Lake Athabaska. There are as fine spruce in the Athabaska delta as are to be found in any part of the Northwest. I have measured trees on the Embarass river that were two feet and a half in diameter and were very tall. On the Peace river, likewise, especially on islands, there are many large groves of spruce and poplar, which attain extraordinary dimensions.

MINERALS.

Prof. Macoun said he had not the slightest doubt whatever that the coal of the Belly river and the Bow river and the Saskatchewan extends away down the Mackenzie to the Arctic sea. He was the first party that brought the coal from that country, and he took a great interest in it then—sixteen years ago. It was found near Little Slave lake. The witness crossed from Edmonton to the Peace river in 1872, and saw coal seams 14 feet thick in the valley of the Pembina, a river that flows into the Athabaska. That was just at the crossing toward Lake Ste. Anne's. Then again they crossed the Athabaska river and struck through the country heading for the head of Little Slave lake, and on a river called Swan river, which empties into Little Slave lake, he found

masses of coal lying on the river's banks in large blocks, fully as good as that used at Edmonton, and equally valuable. He was satisfied from what he saw of the coal on that river that it was equal in quality to that of Edmonton. About Dunvegan he got coal which he lit in the lamp and found to burn splendidly. When he put a few pieces of it together it burned very well, although the seam that he got there was thin, but since then better seams have been found, and there is no doubt at all that there is coal on the upper waters of the Peace. Anyone reading Sir John Richardson's works could see at once that there is coal on the Lower Mackenzie. There is coal all the way from the boundary to the north.

CLIMATE.

As to the climate of the Peace river valley, Prof. Macoun furnished the committee with the following extracts given him by Daniel Williams, of Fort St. John, commonly known as 'Nigger Dan,' and taken from the note-book he kept:—

1872.

Ice began to run in river, November 8.
River closed November 28.
First snow, October 28.

1873.

April 23, ice moved out of river.
Planted potatoes April 25.
First permanent snow, November 2.
River closed November 30.

1874.

River broke up, April 19.
First geese came April 21.
Sowed barley and oats, April 22.
River clear of upper ice from above the Rocky Mountain canon, May 25.
Planted potatoes, May 5.
Potatoes not injured by frost until September 22. Then snow fell, which covered them, but soon went off. Dug over 100 bushels from one planting. (?)
Ice commenced to run in river, October 30.
River closed, November 23.
Snowed all night, November 4.

1875.

Ice broke up in river, April 15.
Warm rains from northwest; blue flies and rain, February 18.
Ice cleared out in front of Fort, April 16.
Potatoes planted, May 8, 9 and 10.
Barley and oats sown, May 7.

Snow all gone before the middle of April. This applies to both the river valley and the level country above. Difference in level, 746 feet.

Prof. Macoun explained that in the Peace river country, the snow passes off so easily that as soon as it is off the ground and a few inches of the soil thawed, the ground is ready for seeding, because the soil is friable and the snow of little depth.

The character of the month of September is almost identical with that of our very best Septembers in Ottawa—a smoky atmosphere with occasional white frosts in the morning, but generally a calm atmosphere. In October the frosts get more severe towards the last of the month. About the 25th at Fort Chippewyan ice begins to form and the rivers and lakes soon close.

The intensity of the winter cold has in reality no effect whatever upon vegetation; it does not seem to have any injurious effect on any tree or shrub that there is in the country.

'The winter is about as severe as in Manitoba. The effect of the cold is not so injurious to either vegetation or stock, because the country is less exposed to cold winds. Again, the spring, unlike that of Ottawa, is as regular, almost as the rising and the setting of the sun, owing to the climate being uninfluenced by any extraneous circumstances. About the 15th of April is the average time of the opening of the spring flowers, and spring may be said to commence every year at the same time (from the 15th to the 20th), every year without exception. Having a fixed spring, we know that we have a fixed summer. The warm weather continues and the heat increases onto the middle of August. Then there is a lowering of the temperature, and, if rain occurs, local frosts. There is a beautiful September, and the ice begins to form about October 25. That is the general picture of the whole year as far north as Fort Chippewyan. It is evident that as we go farther north the spring opens later and the winter sets in earlier. The data given in answer to other questions will show this. Owing to the great length of day between latitude 56 degrees and 65 degrees, vegetation is influenced by the sun on an average 18 hours out of the 24, and hence in this northern region at least two hours a day, on an average, more sunlight is given for the promotion of vegetation, and therefore it is not unreasonable to expect a remarkable rapidity of growth, earlier maturity and a superior quality of produce.

COOL NIGHTS BENEFICIAL.

'It seems to me that the coolness of the nights in June and early July has much to do with the wonderful productiveness of all kinds of vegetables that either grow wild in the country or are cultivated by man, and that the sweetness of the berries and the enormous produce of the cereals are produced from the combined causes of this cool night and long sunshine.

'The larger lakes and rivers exert an influence in keeping off the summer and autumn frosts. Lac la Biche, on the height of land above Edmonton, is noted for the absence of frosts in autumn, and in this case it is ascribed to the proximity of the lake. Isle a la Crosse post is affected exactly the same way. In 1875 potatoes were killed by a severe frost all through Manitoba on August 18, yet on September 22, I found the potatoes still green at Isle a la Crosse, in lat. 56. The only way I could account for this was the proximity of the lake.'

Prof. Macoun produced the following extract from the Hudson Bay Company's journal, Fort St. John, Peace river, for a series of ten years. (Lat. 56° 12′ north, long. 120° west. Altitude above the sea, nearly 1,600 feet).

Opening of river.	*First ice drift in river.*
1866—April 19	November 7
1867— " 21	" 3 or 8
1868— " 20	" 7
1869— " 23	" 8
1870— " 26	No record.
1871— " 18	November 10.
1872— " 19	" 18
1873— " 23	" 4
1874— " 19	October 13
1875— " 16	No record.

Asked what reasons he could give the committee, climatic or other, for the luxuriant vegetation of the far Northwest, Prof. Macoun replied:—'For years it has been known that the vegetation around Lake Superior is far more luxuriant than the vegetation to the east. Species growing in the woods here

(Ottawa), for instance, may attain a height of three feet; there they are almost tropical in their appearance, they grow so luxuriant and so tall, and the question has been asked: Why? Here the atmosphere is comparatively dry, and instead of a constant growth and a constant development of the parts, at the very warmest time, the growth ceases. On the other hand, at Lake Superior, the coldness of the nights seems to vivify the plants, and prepares them for another rush in daytime. Precisely similar conditions exist in the Mackenzie river district. For eighteen hours a day or more, the sun pours down in that country, and the few short hours of the night certainly are comparatively cool; and it seems as if the vegetation was reinvigorated, and when morning comes again it goes on with another start, so that the three months of growth in the Peace river region are three months of a rush. You see there is moisture enough, there is heat enough, and, I believe there is coolness enough—that naturally the coolness of the region is strengthening to the vegetation. So that we have the condition on that upper plateau for the most luxuriant growth, and the most remarkable productiveness. I am speaking now from a scientific standpoint and not from any guess, and I am prepared to follow these remarks up in a more elaborate manner if necessary. You can see at once the reason for this wonderful growth: heat, moisture, a re-invigorating time at night—because I contend that vegetable life wants a cessation of warmth just as much as the human species.'

THE CHINOOK WINDS.

'For sixty years past it has been known that the section of country extending say from St. Paul northwesterly, right down the Mackenzie valley has been noted for the curving north of the summer isothermals. Now, many people say that the cause of the curving of the isothermals is the breezes from the Pacific ocean. * * *

'I found on investigation that the rain winds of the American interior—that is the rain winds which supply the Mississippi and Saskatchewan, and if you choose, the Great Mackenzie river, were drawn up by the sun down in the southern Pacific; that they floated up on the northeast Trades, and when the northeast Trade struck the coast of America, south of Lower California, that the air was so hot that they actually had no power to give out their moisture. The answer to this is given to-day: At San Diego, in southern California, where rain does not fall for nine months, and sometimes not in a year. Then the Pacific winds and the Pacific moisture is constantly coming on that coast and the question is: "Where does it go?" It goes eastward and northward, and as it passes in on the land, it warms up the whole region above the normal temperature. Blodget, the great authority on atmospheric currents, states that at Fort Yuma, in the valley of the Colorado, there is actually the warmest climate, not alone in America, but in the world, with an average temperature throughout the year of 73 degrees. What is the cause of the heat? It is the influx of the heated air from the south, loaded with moisture. Following this up we find that the isothermal crosses precisely in the same way up over the Salt Lake valley, and passing north enters into our country in the valley of the Kootenay; and on the east side of the Rocky mountains about the 114th meridian. From the boundary of British Columbia, this warm current passes up the Kootenay and the Similkameen, passing up into the Cache Creek country, and Babine lake, and enters into the country which Dr. Dawson told you yesterday contained sixty thousand square miles of land, with a climate suitable to the growing of cereals. Then you see we have two currents of warm air—none of your little local matters, but two currents of warm air drawn inwards precisely in the same way that the high plateau of Asia actually draws the southeast trade onto it. We have the winds from the Gulf of Mexico and the Pacific drawn northward on account of the American desert in exactly the same way as in Asia. The American desert to the south of us is the father of our grand country to the north, as it gives us both heat and moisture. It is the heating up of the wind in that desert that causes the spring in the Rocky mountains and along the Peace river valley to be ahead of the spring in

the region where we now are. The Peace river in latitude 56 has its banks covered with anemones and other flowers to-day (April 26), while here, eight hundred miles to the south, they have not yet made their appearance.

EXTENT OF THE CHINOOKS.

'We are to infer that these winds prevail down as far as the mouth of the Mackenzie river, because when a current of air gets moving it cannot be stopped without a force greater than itself intervenes, which is a stream of air of a colder nature, and the two have to be stopped; consequently explorers have found that when those winds blow, they change the whole aspect of affairs in winter time. Instead of those little winds coming through the passes of the mountains, I maintain that there is a rush of warm air and moisture forced up from the Gulf of Mexico on the one hand and from southern California on the other, which passes west of the mountains, one part to the country that Dr. Dawson speaks of and the other part down the Mackenzie River valley, and if you choose, out into the Arctic Ocean.'

Asked to define how far westward these warm winds extend, Prof. Macoun replied: —'Many of the gentlemen who have ranches at the eastern base of the Rocky mountains, say: "We only have the Chinooks." Gentlemen living as far east as Moose Jaw, say: "It is not so, we have the Chinooks." I wrote twelve years ago that the Chinooks were not local, but that they were the warm winds I have described now. When it is known that the Chinooks have an ameliorating influence as far east as Moose Jaw, 500 miles east of the Rocky mountains, it is as well to ask, does it affect the country still further east. One of the gentlemen examined before this committee—Captain Craig—has told you that they have the Chinooks at Prince Albert, and I whispered to him, "if they pass to Prince Albert, are they not north of that?" I found potatoes still green at Isle a la Crosse, lat. 56°, on September 22, 1875, and that same year the frost killed the potatoes in Manitoba on August 18. Now, you may ask me 'why was there no frost on that higher plateau when it occurred in Manitoba?" "Water and warm air" are my answers. I have shown that these so-called blizzards are from the American desert; that they actually come from the south and not from the north as we say, and that the Arctic winds that are being talked about by newspaper men are actually propagated from the south and west, and they appear to be north simply because the wind is from above, and not our surface wind from the north.'

IN A FIXED CIRCUIT.

'Then you think that the latitude of Isle a la Crosse is within the limit?'

'I certainly think it is within the limit, and I do not stop even there, because I find that Sir John Richardson, when living at Fort Enterprise, near the Arctic circle, latitude 65°, longitude about 115, thought they (the Chinook winds) were there in 1819 when he recorded that, on November 19 the southwest wind blew and it rained, and when the southwest wind blows in any part of our great interior, if it does not rain the moisture disappears and the snow disappears. And the grand southwest winds that God is sending on our country never vary, because they are in a fixed circuit, and no outside circumstances vary them.* * * * *

'It (the Chinook) is the indraft of winds of the nature of monsoons. They are the winds drawn in from the Gulf of Mexico and from the Gulf of California, and the great American desert is the cause of their being drawn in, and is literally the disperser of them to the north.'

'You have given us two eastern points, one Isle a la Crosse and the other is a fort built by Sir John Richardson. Could you give us any intervening point of which there is any record of these warm winds?' witness was asked. 'I have mentioned,' he replied, 'that Sir Alexander Mackenzie, wintering at the Forks of the Peace and Smoky rivers, found that when the southwest wind blew in the winter it got warmer and the

Immense water power on the Chutes of the Peace River, below Vermilion.

snow never got deeper, and as early as April 15 the anemone was in flower upon the whole land. I find from every record that from the 15th to the 22nd of April in every year anemones are in full bloom over that country.'

'Are they in bloom here now?'

'No. My son was out yesterday (April 25) and he could find no trace of them. I have shown that actually the spring comes from west to east at the rate of about 250 miles a day, and it is an absolute fact that from Winnipeg westward up to the Peace river district, the winter is propagated in the same way, only it passes from east to west at the rate of about 250 miles a day. We know that spring is mentioned as having taken place in Winnipeg about a week ago, and we are having our spring commence here to-day. That shows that the spring is coming from west to east here, and I believe, as I said in my first answer, it is our duty to study the natural history and the meteorology of the country thoroughly, and then we will be able to give clear and distinct answers to plain questions.'

MEANS OF COMMUNICATION.

In 1872, Prof. Macoun was sent by Mr. Fleming, who was then exploring for the Canadian Pacific Railway, from Edmonton to the Peace river district, and the party had the book with them that Judge McLeod spoke of having written. It was his book that caused Mr. Fleming to send witness and another gentleman to explore the Peace river and see if there was a pass there. They made their way from Edmonton to the Peace river and reached the river about the last of September.

When they reached the bank of the river they came upon it suddenly as if they were walking across this room; there was no appearance of a river at all as they approached. The country was perfectly level and there was no appearance of the river until they came almost upon the verge of a steep bank. They could see the country on the opposite side of the river, and no one would suspect there was a river intervening. Yet, seven hundred feet below there wound a mighty river. Witness had never seen a river like it in any sense. He asked the members of the committee to picture to themselves a river 800 yards wide, meandering through a narrow but very deep valley. The explorers were 700 feet above the water of the river. They could look to the left up the Smoky river and to the right to the sandstone cliffs, miles below. That was in September, 1872.

In 1875 witness was selected by Dr. Selwyn and appointed by the government then in power to go out as a botanist to the party led by Dr. Selwyn. He went with Professor Selwyn to the Pacific coast and crossed into the interior by the Fraser by way of Fort St. James until they came to Fort MacLeod, west of the Rocky mountains and in latitude 55°. The Peace river lies pretty near the big bend of the Fraser, near Fort George. They came into the Peace river valley from Fort St. James. At Fort McLeod one branch of the river takes its rise. It is called on that side of the mountains, the Parsnip. It gets its name from the cow parsnip, which the Indians eat the stalk of like rhubarb.

From there, three years before, in the latter part of October and the first days of November, he had gone up the river with a large flat bottomed boat with four Indians and two white men, and found no difficulty whatever. There is not a rapid in the river at all, so they found no difficulty whatever in bringing the boat all the way from the Forks of Finlay, as it is called, up the Fort McLeod river.

In going down, in the first days of July, 1875, the river was in flood, and of course it was fit to carry a steamer of 22 feet draft in some places; but at the very lowest stage in November they had found no difficulty in taking their boat up and met no rapids whatever in that part of the Peace river called the Parsnip, between the entrance of Fort McLeod river, and where it enters the Rocky mountains to turn to the east.

For fifty miles in the mountains there is nothing to interfere with the navigation. There was no steep fall of water, simply rock, or boulders in the stream. What

is called the Rocky mountains canon is ten miles east of that. Then the river breaks its way through the rocky escarpment, the foothills of the Rocky mountains. When it gets through the Rocky mountains it sinks down at least 1,000 feet in the ten miles.

There is no use in trying to get in through there, a portage being necessary. Dr. Selwyn made the portage ten miles; witness made it twelve. When they got through, they were on the verge of a steep bank a thousand feet above the river, and that character the river retains all the way down. It runs in that deep gorge. That is why the old explorers going up the stream marked along the Peace river, 'here, mountains,' but they never climbed up to see what was above. They were all the time looking at the bank of the river. When witness climbed up he found from where the river left the mountains, it was getting lower and lower, and at the end of 500 miles it was not more than 500 feet below the level of the country. But at Dunvegan it was 700 feet. Mr. Horetzky and witness measured it, and found it that distance from the level of the prairie. The country above that was found to be as level as a floor. The Peace river country is without hills. Witness never saw a hill near the river. From the water it looks like a mountain chain on each side for 500 miles, but witness climbed up at several places, and the character of the country was as he had described it.

Witness descended the river for 770 miles from the lower end of this portage of ten or twelve miles, and he asked the members of the Committee for 550 miles from this obstruction, to picture to themselves a river that commences at 500 yards in width and ends at over 1,000 yards, going through a valley with immense bends. When they would look up from the river they would see at some places sandstone cliffs 500 feet high, and at other places the broken faces of the bank, sloping back half a mile on either hand. At first there was a great deal of gravel in the bed of the river; as they receded from the mountains the gravel got finer and was without large stones, because it was all sandstone, and broke up easily. As they descended further the gravel got finer until it eventually passed into mud. When they got about 300 miles below the mountain it had turned into mud bars and they saw no more gravel or stone except once in a while, when they would come across where the river had been eating into the banks, and they found the rocks the same as above, that is, nodular, ironstone and some kinds of limestone.

Witness saw no reason why a steamer could not be run on this 770 miles of navigation. He put the depth at the very lowest when he said six feet, for the whole season. They swam their horses in 1872 across. One was nearly drowned. They had to swim over 500 yards without a break. The same season, at Dunvegan, they swam them back again to the other side. They found it was not so wide, perhaps, not more than 300 yards there. There is no such thing as a ford known, so that witness felt safe in saying—and he was speaking of the time the water was at its lowest—that the navigation is good all the season.

While at Fort St. John, witness got permission from the officer in charge to examine the records, and found that the first ice—not the closing of the river, but the first ice seen in the river—averaged about the second or third of November. Of course the river would not close for over a month after that. As regards its opening, witness was there in the autumn of 1872, and, as he had already said, went through the mountains and took the boat up to latitude 55 in British Columbia, and passed through in the last days of October, and reached Fort McLeod on November 5, and there was no obstruction to navigation. On November 7 the Parsnip, that they had gone through two days before, closed. There was nothing to obstruct the same men when they went through the Rocky mountains. It had not closed down there.

The next spring, Capt. Butler went up the river and wrote his book called 'The Wild North Land,' and on April 22, he crossed the river, went up the slope of the bank and found the whole slope covered with blue anemones—that is, on April 22, and the river was open before that time. So there are the two records for the winter of 1872-3.

EVIDENCE OF THE HONOURABLE WILLIAM CHRISTIE.

Hon. William Christie, ex-member of the Northwest Council, late Inspecting Chief Factor of the Hudson Bay Company service, in 1888 resident at Brockville, Ont., was examined before the committee on April 12.

Witness explained that the country he had travelled through extended from Winnipeg northwards to Fort Simpson on the Mackenzie river. As inspecting factor of the Hudson Bay service he was in charge of all the districts from the Red river to Fort Simpson—from Winnipeg, (or as it was called then, Fort Garry) northward—the Red river district, Swan river district, English river district, Athabaska river district, and Mackenzie river district. All of these were under his supervision. He had travelled over the whole of them and descended the Mackenzie river as far as Fort Simpson, which is 300 miles from its source.

The fort is built on an island at the junction of the Mackenzie and the Liard rivers. The Liard is a quarter of a mile or so wide where it runs into the Mackenzie. Fort Liard is close up to the mountains, about 300 miles from the mouth.

Witness did not think that any authoritative attempt had ever been made to collect statistics, &c., as to resources of this region. The business of the Hudson Bay Company was confined to the fur trade, and if there were any scientific investigations in the old days they were conducted under the authority of the British government.

AGRICULTURE.

The only part of the great Northwest region about the agricultural possibilities of which Mr. Christie was sanguine, was the Peace river country, which he considered 'is one of the finest countries that you would wish to see. The Upper Peace river country is as fine a country as I ever saw.' He did not think the Peace river country subject to droughts at all, but the winter snow disappeared much more rapidly than it did in Manitoba. The vegetation in the Peace river country is very luxuriant; the grass is more like that of Manitoba than of Saskatchewan. He thought the wheat crop would be as certain in the Upper Peace river as in the Saskatchewan district. Farther down, at Lac la Biche, they never have wheat frozen; that may be affected by the temperature of the lake water. On the Upper Peace river they are less subject to frost. Witness had always understood that wheat grew well at Dunvegan.

At Vermillion there was a splendid country. He once rode with Governor Dallas 60 miles through a most magnificent country. The soil was a beautiful dark loam, as they could see by the mole hills, and they were struck with the charming appearance of the country. There were more bluffs than were found on the Saskatchewan; and it was a beautiful country all the way up to Dunvegan. Where the country was open, the grass was higher than on the Saskatchewan. It was not very long—about the same as in Manitoba. As to the testing of the capacity of the country for agriculture, witness explained that a good deal had depended upon the characters of the officers in charge of the various forts whether the capacity of the country in the vicinity, for agriculture was tested. In the journals of long ago he found that they used to raise splendid wheat crops at Dunvegan, and cattle. Another officer, without any taste for agriculture, going in there might find it very difficult to live. If he had no taste for gardening or agriculture, nothing would be raised. A great deal depended on the officer of the post whether he lived well or not. If he was active and energetic he would always live very well.

Witness agreed with the remark that there is enough good land in the Peace river country to make a new province.

He remarked that he sometimes heard the opinion expressed that our country may ere long become over-populated, but he considered there was not the slightest danger of that. Canadians need not be afraid how many immigrants came into the country

to settle. They might bring in all the immigrants that Europe could send them. There was room for all in the Saskatchewan and Peace river country. There was a vast extent of splendid country from Prince Albert on the whole north side of the Saskatchewan, going away up until the traveller came near Fort Pitt, keeping a little to the north. Then, when he would come to the route of Green lake, there was two days' journey through a magnificent country, beautifully timbered, well watered and supplied with abundance of fish. As he travelled through it, he remarked to one of his men: 'What a splendid country to settle in.'

Green lake, witness explained, is north of Carlton, about 80 miles. One crosses at Carlton and for two days can travel through a prairie country with bluffs here and there, and lakes; it is a splendid country. Then he would travel for two days through a forest to Green lake.

As to the valley of the Mackenzie river itself, at Fort Good Hope and Fort Providence, the Sisters of Charity had very fine gardens. Wherever you meet the Sisters of Charity in that country, you find a well cultivated garden. They grow many vegetables and flowers. They raised potatoes at Fort Providence, and raised barley when they could, he understood.

FORESTRY.

There is considerable red pine and spruce in the region, in fact it was abundant near most of the company's posts. The country north of Lake Athabaska is rocky and covered with stunted pine. The only timber about Great Slave lake was small, stunted pine trees on the low ground round the shores. Very good wood, pine, can be got near the end of Athabaska river, where it falls into Athabaska lake. The diameter of the largest trees would be eleven to twelve inches.

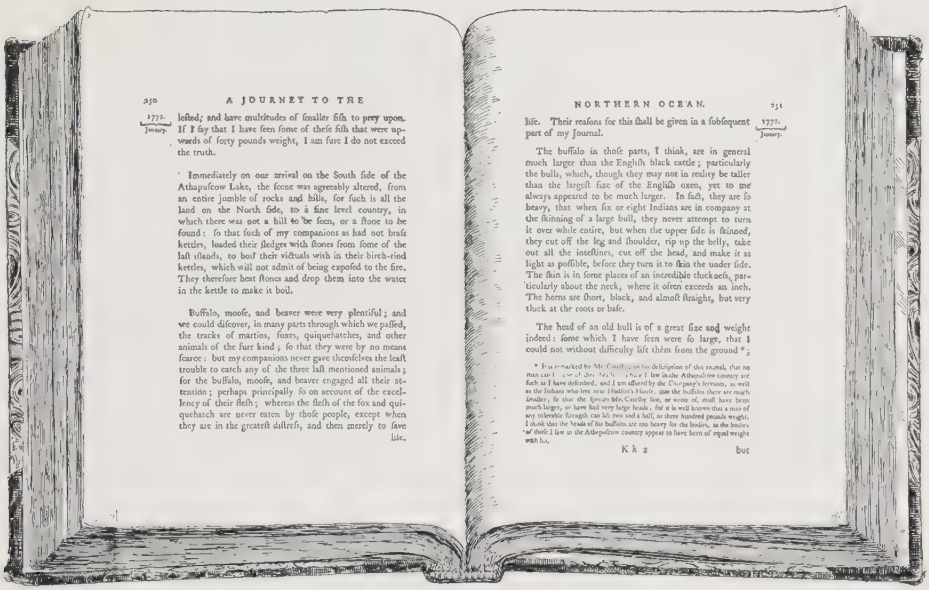
FISHERIES, FUR AND GAME.

The main support of the people of the Lake Athabaska district was the dried cariboo or reindeer meat which was obtained from the Chippewyan Indians, who hunted the reindeer in the barren lands. The Hudson Bay Company had a post at the end of Great Slave lake for the trade in the dried reindeer meat that the Indians bring in from the barren grounds. The reindeer resorted there in large numbers in the summer time to avoid the flies and feed upon the moss. The Indians watched for them and killed them in great numbers while crossing the streams. Sometimes, when a great number are killed at one place they will shift their track to another route. In the winter the cariboo move to the edge of the woods for shelter.

The muskox inhabited a district farther north than that in which the cariboo were found. He is the most northern animal of all, the largest animal found within the Arctic circle. The company got a few—a very few—musk ox hides at Fort Churchill and Fort Rae. This animal kept pretty well in the open country along the Arctic coast. Witness was four years at Churchill, and was asked by a friend to get a musk ox robe for him, and he was two or three years looking for it before he got it.

The wood buffalo roamed over the Athabaska country, chiefly in the woods; but in the summer they came down to lick the salt at the salt springs in the valley of the Salt river that flows into the Great Slave lake river. Witness understood that these wood buffalo were in small bands of four or five.

Witness considered the wood buffalo to be identical with the plains buffalo. Long ago the latter species was found as far north as the Peace river in great numbers, and the plain Indians, the Sarcees and others, were then in the Peace river country. There is a place called Battle river in the Peace river valley, where these plains Indians had a tremendous battle, and it is called Battle river from that circumstance. The plain buffalo were in that country then in thousands, just the same as they were in the plains. As they got hunted up by the Indians, they moved out, and the Indians moved out of the Peace river also after this great battle and went into the plains. **The battle**



250 A JOURNEY TO THE

1772. January. lested, and have multitudes of smaller fish to prey upon. If I say that I have seen some of these fish that were upwards of forty pounds weight, I am sure I do not exceed the truth.

Immediately on our arrival on the South side of the Athapuscow Lake, the scene was agreeably altered, from an entire jumble of rocks and hills, for such is all the land on the North side, to a fine level country, in which there was not a hill to be seen, or a stone to be found: so that such of my companions as had not brass kettles, loaded their sledges with stones from some of the last islands, to boil their victuals with in their birch-rind kettles, which will not admit of being exposed to the fire. They therefore heat stones and drop them into the water in the kettle to make it boil.

Buffalo, moose, and beaver were very plentiful; and we could discover, in many parts through which we passed, the tracks of martins, foxes, quiquehatches, and other animals of the fur kind; so that they were by no means scarce: but my companions never gave themselves the least trouble to catch any of the three last mentioned animals; for the buffalo, moose, and beaver engaged all their attention; perhaps principally so on account of the excellency of their flesh; whereas the flesh of the fox and quiquehatch are never eaten by those people, except when they are in the greatest distress, and then merely to save life.

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life. Their reasons for this shall be given in a subsequent part of my Journal. 1772. January.

The buffalo in those parts, I think, are in general much larger than the English black cattle; particularly the bulls, which, though they may not in reality be taller than the largest size of the English oxen, yet to me always appeared to be much larger. In fact, they are so heavy, that when six or eight Indians are in company at the skinning of a large bull, they never attempt to turn it over while entire, but when the upper side is skinned, they cut off the leg and shoulder, rip up the belly, take out all the intestines, cut off the head, and make it as light as possible, before they turn it to skin the under side. The skin is in some places of an incredible thickness, particularly about the neck, where it often exceeds an inch. The horns are short, black, and almost straight, but very thick at the roots or base.

The head of an old bull is of a great size and weight indeed: some which I have seen were so large, that I could not without difficulty lift them from the ground *;

* I am remarked by Mr Cuvier, in his description of this animal, that no man can [illegible] these I saw in the Athapuscow country are such as I have described, and I am assured by the Company's servants, as well as the Indians who live near Hudson's House, that the buffalo there are much smaller; so that the species Mr Cuvier saw, or wrote of, must have been much larger, or have had very large heads, for it is well known that a man of any tolerable strength can lift two and a half, or three hundred pounds weight. I think that the heads of the buffalo are too heavy for the bodies, as the bodies of those I saw in the Athapuscow country appear to have been of equal weight with us.

The above is a part of Samuel Hearne's account of a buffalo hunt in company with a large band of Indians, on the south shore of Great Slave Lake, east of Slave river, in midwinter (January) 1772.

Hearne, who has been sometimes called "The Mungo Park of Canada", made a journey from Fort Churchill to the Arctic ocean to explore the interior, conciliate the Indians and ascertain the possibility of increasing trade for the Hudson Bay Co., and one of the results was the discovery of the Coppermine river. The journey occupied about two and a half years and it was on his way back to Churchill that the above hunt took place.

Athapuscow lake mentioned is Great Slave Lake.

This appears to be the first account of a buffalo hunt in the Northland of Canada and one of the earliest as to any part of the Canadian Northwest.

It is interesting for that reason and also in consideration of the fact that the locality is over 500 miles north of the present city of Edmonton. That buffalo should have roamed so far north in immense numbers at that early date and that they should be found there in midwinter surely has a bearing on the possibilities of the north country as a cattle raising country.

in question was fought perhaps 100 years previously. A number of the plain buffalo got into the woods and bred and remained there and were still living in the woods there. They had grown larger in some way, but they were just the same as the plain buffalo. Those who had killed some of them said they had increased in size in the woods, possibly from not being disturbed so much and not having to move about as the plain buffalo had to do. The wood buffalo lived in the woods, on the grasses that they found. The buffalo does not scrape; he breaks the snow with his nose and eats that way. Unless the grass was pretty long he could not get his living there in the winter. About four or five hundred pounds would be the weight of a wood buffalo. A buffalo cow in the plains, after being dressed, would weigh about three hundred pounds; one of these wood buffalo would weigh about three hundred and fifty to four hundred pounds, dressed.

Speaking of the possibility of using the wood buffalo for hybridization purposes, Mr. Christie explained that as far back as 1842, the Hudson Bay Company had at Fort Edmonton a herd of buffalo. They began by taking some calves, and from these the herd increased until they had some thirty altogether. These used to herd out with the other cattle and come in with them. All at once the buffalo came near Edmonton and this herd went off with the others. It was the impression then, from their mixing with the other cattle, that they would not cross, because there were not any signs of it.

There was a great deal of small game and considerable supplies of fish throughout the country. The Athabaska lake was a large body of water well stocked with fish, extending northward towards the barren grounds. There was a post at the north end of the lake, Fond du Lac, for trading dried provisions and grease from the Chippewyans who hunted the reindeer in the barren grounds. It was a great resort for wild fowl passing south in the autumn. They alighted there in millions, geese and swan, to feed.

Salmon was found in large numbers on the Churchill, as soon as the ice cleared out of the river, about the middle of July. They entered the river and went out of it with the tide. They did not run up the river to spawn. He thought these salmon quite as large as those he had seen in Scotland.

Being a retired officer of the Hudson Bay Company, Mr. Christie asked to be excused from giving evidence as to the value of this region as a fur country.

MINERALS.

As to the value of the Mackenzie basin as a mineral country, it was a known fact that all the streams from the mountains, south of Saskatchewan even, and going north, are auriferous, that is to say, indications of gold are found in them. He made that statement on the strength of what he had been told by miners who had gone up as far north as the Liard, into the mountains. Then there were the journals of the Arctic expeditions—Franklin, Richardson and others—that on the Coppermine river, copper exists in large quantities.

Asked if the natural pitch on the Athabaska river had any prospective value, Mr. Christie replied: 'No; it is valuable to the company who use it, but they are the only persons to whom it is valuable. It saves them the cost of transporting pitch and tar into that country for their boats, and they use it for that purpose.' The deposit was very deep. It was in springs in the sides of the banks of the river. The bank at that point was not very high. A few pine trees grew at the top of the bank, and there are one or two springs there. They boiled up there in the summer. You could put a long pole down, ten or twelve feet long, and you could not find bottom. The pitch was black and very adhesive. It was like English pitch, but it had no smell of tar. They used it at Fort McMurray to cover some of the houses, and it looked like an asphalt pavement.

Salt river, which falls into Great Slave river, derives its name from the fact of there being salt springs about a day's journey inland from Slave river. The

springs boil up and evaporate, and the salt is left there quite pure. It is used on Lake Athabaska and the Mackenzie river. The Hudson Bay Company's employees go there by land with pack horses and shovel it at the springs quite pure. They can get any quantity of salt that they want.

CLIMATE.

Although thermometer readings were kept at York Factory and Churchill, there were no records of rainfall and snowfall, or anything of that kind. 'Coming out' from Fort Simpson, the witness and party left on December 5, and spent the whole winter crossing overland to Ottawa, reaching the last named point March 8. They found a great deal more snow southward than on the Mackenzie river. Perhaps there might have been from two to three feet of snow on the level there. On the Churchill there were immense drifts of snow.

In the winter the nights in the Mackenzie basin are very long; in the summer very short. In fact, at midsummer, there is hardly any night at all. Down on the lower posts on the Mackenzie witness did not think they had any nights at all in the summer. He arrived at Fort Simpson on October 22, and left on December 5, and it generally used to be dark about three or half-past three in the afternoon at those dates. Then we had a long night until the next day, perhaps nine or ten o'clock. At Fort Churchill in midsummer there is just a sort of twilight of a couple of hours; the rest of the day it is all daylight. In winter, of course, the nights are very long at Churchill; it is dark generally about half-past three or four in the afternoon, and daylight does not come before nine o'clock the next day.

SETTLEMENTS.

The Hudson Bay Company's posts on the Mackenzie river were established about every 300 miles all the way down the river. Then there were other posts on the lakes. Fort Simpson was at the head of the Mackenzie river district. Then the next post going down the river was Fort Norman, and they had a post on the Great Bear lake. There were Sisters of Charity at Fort Good Hope, and at Fort Providence they had a splendid mission.

There was no settlement around any of the company's forts. The white men in the forts were largely from England and Scotland—gentlemen's sons—and some got married to Indian girls and French half-breeds.

Traders, other than those of the company, were going in for furs, up as far as Great Slave lake. The Hudson Bay Company opposed them the best way they could; but had sold the country to the Canadian government.

The Church of England as well as the Roman Catholic Church, had missions throughout the region.

MEANS OF COMMUNICATION.

Witness did not think there would be any difficulty in navigating with suitable steamers the Mackenzie from its headwaters to the Arctic ocean, because the year before his examination they had had the experience of a successful voyage of the Hudson Bay Company's steamer from Fort Simpson down the Mackenzie river nearly to its mouth, below Peel's river. They could have gone through to the Arctic sea if they had wished to do so, but having no pilot, and not knowing which of the channels they should take, they did not like to venture. It would have been a disastrous thing to the company if that steamer had met with any accident which would have prevented it from returning to the Slave river that season.

The distance from Fort Smith to the Arctic sea had never been measured, but it was about 60 to 100 miles down Slave river to the Great Slave lake; then 250 miles across the corner of Great Slave lake to the head of the Mackenzie; that is Fort Providence.

From Big island or Fort Providence, at the head of the Mackenzie river to Fort Simpson is 203 miles; from Fort Simpson to Fort Norman, the next post down the river, is 271 miles; from Fort Norman to Fort Separation, 434 miles; from Fort Separation to the sea, 129 miles—total length of the Mackenzie from its source to the Arctic sea, 1,037 miles, according to Sir John Franklin.

The Great Slave lake is the source of the Mackenzie, which is a large river, with an average width of a mile and a quarter. It maintains that breadth all the way down from Fort Simpson to the sea. The water of the Great Slave lake is very deep; as deep as Lake Superior. The point he crossed from Fort Resolution coming out of Great Slave river and crossing a corner of the lake is 250 miles. There are very few harbours, only one or two, and not good ones at that. There are two harbours, I think, where a steamer could run to, and there are islands before you reach the head of the Mackenzie—say about three harbours where a vessel could find shelter. Witness thought Great Slave lake might be 600 miles long. The seas sometimes running on it were quite as heavy as those on Lake Superior.

Mr. Christie considered navigation by Hudson bay more certain than by Behring straits. During the search for Sir John Franklin's lost expedition, however, Commander Pullen, of H.M.S. 'Plover,' sailed from Honolulu for Behring strait and Mackenzie river. He went as far north as he possibly could get with the 'Plover.' Then with Lieut. Hooper and some sailors he took to the boats and coasted along to the outlet of the Mackenzie river. The party ascended that river with their boats to Fort Simpson the same fall—tracked their boats. The 'Plover' returned to Honolulu that same season.

Witness was eight years on the coast of Hudson bay and the latest any vessel left there was October 4th, and she got home, but it was touch-and-go. He would say that the straits are navigable for four months at the most.

EVIDENCE OF BISHOP CLUT, O.M.I.

The Right Reverend Isidore Clut, O.M.I., Bishop of Arindele, whose missionary diocese included the Mackenzie basin, at first submitted to the committee a complete set of answers to the set schedule of questions, and later appeared in person and was examined orally.

AGRICULTURE.

Bishop Clut considered that all the country around Lac la Biche and up to Lesser Slave lake, all that on the Peace river and that on the Liard river was suitable for settlement. About Little Slave lake, which he had visited, the soil appeared to be excellent, and the soil along the road between Little Slave lake and the mouth of Smoking river was also of a superior quality. On the borders of the Peace river and the Liard river there were a good many magnificent sections of good alluvial lands.

In several places in the basin of the Mackenzie there were a great number of natural prairies, those with round hay and those with flat hay. The round hay, in certain places grew from three to five feet in height. The flat hay was also very fine, but a little shorter. It grew everywhere in the low and wet places.

Witness had observed a good deal of wild pease in the neighbourhood of Lac la Biche. There was also some at Athabaska and along the Peace river.

At Lac la Biche the missionaries having set the example of cultivation, as they had done nearly everywhere throughout the rest of the Mackenzie valley, there were at the date this evidence was given, good farms all around the lake. On the Peace river at Dunvegan, and Vermillion, the missionaries had fine farms, which gave excellent results. At the Catholic mission at Providence, the residence of the bishop, one year he had 1,440 barrels of potatoes—(one barrel 10 gallons)—from 60 kegs of seed, but this was a very favourable year. They had been greatly favoured by the heat and by

rain at opportune times. On two or three occasions they had had a thousand and twelve hundred barrels of the same roots.

At the Providence mission there was an excellent clay, which was very good for cultivation. Throughout the country in general the bishop found all sorts of land, black soil, loam, clay, sand, marl, &c. Generally they harvested their potatoes at Providence from September 20 to 30. Turnips, carrots, beets, &c., they harvested a little later. Wheat on the banks of the Peace river and Liard river was ripe towards the end of August; at Athabaska and at Providence from September 15 to 25. Barley was ripe a little sooner throughout. Rye does not ripen any sooner than wheat, but witness had not made many experiments, for the reason that they like wheat better than rye. Oats they harvested at the same time as wheat, but they had only sowed it once. Potatoes they harvest at Athabaska and at Providence, from September 20 to 30. Turnips, carrots, beets, radishes, &c., they harvest later. Indian corn generally cannot get ripened below Athabaska or on the Mackenzie. Strawberries commenced to ripen towards July 15; gooseberries ripened towards the end of August, and at the commencement of September. Raspberries and currants come after the strawberries. There were also in places many blueberries, cranberries and other small fruits, such as poires sauvage (Saskatoon), &c. Barley ripened at Fort Norman, at the mouth of Great Bear Lake river. Consequently it grew at Fort Wrigley or Fort Simpson, and at Fort Providence. In the Liard river and Peace river countries it succeeded also very well. Brother Kearney and the Hudson Bay Company had grown potatoes at Fort Good Hope (Polar Circle), at the mission at Providence, and at all the Roman Catholic missions on the Mackenzie river, the Liard river, the Peace river and the Slave river, &c., potatoes and other vegetables were cultivated very successfully.

Wheat grew at Providence mission, at Fort Simpson, but it rarely arrived at perfect maturity. It ripened much better on the borders of the Liard river and the Peace river. At the mission of the Nativity (Fort Chippewyan at Lake Athabaska) they had often grown fine wheat. At the mission of the Nativity (Athabaska), at Fort Resolution (Great Slave lake), at Fort Smith, at the mission of Fort Providence, they sowed from the time the land began to thaw, that is to say, from May 15 until June 8 or 10. Throughout the length of the Liard river and the Peace, sowing began a little earlier. At the end of August they had already harvested barley and wheat.

Flowering shrubs and flowers flourished a short time after the snow disappeared each spring. Plants which were deep in the ground, such as potatoes, took a good deal of time to spring up because of the ground being frozen below, but those which were near the surface of the ground commenced to grow very soon, and the nearer one approached the north, for example at the Polar circle, the more rapidly did the vegetation begin, because of the greater length of the days, or the days being without nights. In 1886 the bishop observed the matter at Good Hope. Towards June 7 or 8, vegetation commenced, and in five or six days the leaves of the trees had reached their natural size. It was because then it commenced to be warm, and very warm, and that continued, save when sometimes north winds set in, which would bring back the snow and cold and sometimes injure the crops.

It was difficult to say the extent of country fit for pasturage, and the cultivation of cereals or other plants. In certain sections, such as Vermillion and Athabaska (Fort Chippewyan), at Providence, &c., there were very large natural prairies. The bishop was unable to say the extent of these cultivable lands, for the reason that their cultivation had not been tried, except by the missionaries, and a little by the Hudson Bay Company.

The land about Athabaska lake was very poor for vegetation. The north and northeast shores were rocky or covered with boulders. The south and southwest shores were sandy.

During his examination before the committee, Bishop Clut was asked:—'How far north has the potato been grown to your knowledge?'

He replied:—'We raise potatoes even as far north as the Polar circle at Fort Good Hope, but they are very small. We have no bread there, and an Irish brother has

raised potatoes every summer. Once I passed a winter there and they had very little potatoes. Out of five bushels planted they only got six bushels. Two years ago I passed the winter there, and out of ten kegs planted they got twenty-five. At Fort Simpson and Fort Wrigley, at Providence mission and up the Liard river the potatoes are very good. In Peace river potatoes ripen well and are large.'

The Athabaska and Peace river districts and the country along the south branch of the Liard river were certainly good for agriculture, but he fancied it was only along the rivers that agriculture was safe. He did not think it would be safe in the interior of the country, because of the summer frosts to which he had referred. The country east of Great Bear lake and Lake Athabaska was no good for agriculture, being principally rock and sand.

They had gardens at nearly all of their missions, and raised potatoes, carrots, beets, onions, cabbages, turnips and lettuce. Even at Fort Good Hope they raised turnips and carrots. The cabbages raised at Providence and on the Peace river were very large.

Wild roses grew in abundance as far north as Good Hope.

Horses, at that date, had not been taken farther than Great Slave lake, but cattle had been taken as far north as Fort Good Hope. They were found at the principal establishments of the missionaries, and at the forts of the Hudson Bay Company.

FORESTRY.

All the basin of the Mackenzie was in general wooded. It was only on the banks and in the east and north—the barren grounds—that the country lacked forest. The most abundant wood—at least the most useful—was the spruce. It occurred throughout along the rivers, about the lakes, and in the interior of the country. There were also a good many larch or red spruce. The aspen and the poplar were very abundant, as also was the birch. The birch of the country was very hard, and would make good furniture. It was from the birch that they make traineaux (sleighs), buggies, chairs and snowshoes.

On the Liard river, the south branch of which the bishop had ascended often, and on the Peace river also, there were magnificent forests of spruce. The trees were from 80 to 100 feet high on the islands. Spruce was also abundant on the Mackenzie.

Along the Great Slave river and Fort Smith to Fort Resolution there was a great quantity of beautiful forest, white spruce or ordinary larch. Spruce trees from two to three feet in diameter were found. Along the Liard river and its southern branches, taller and larger spruce might be found.

In the country lying to the south and west of the Great Slave lake there was a good deal of forest of beautiful coppice wood, ordinary spruce, and black or red spruce.

FISHERIES, FUR AND GAME.

Bishop Clut emphasized the fact that an important natural resource of the country lay in the immense quantities of fish found in the great lakes, the Athabaska, Great Slave and Great Bear. East of those lakes there were many other great lakes which were full of fine fish.

Lake Athabaska was full of fish—the whitefish and trout of several kinds, the pike, and carp, &c.

The Great Slave lake, in addition to the fish which were to be found in Lake Athabaska, possessed besides a species of very fine fish called the 'inconnu.' This fish is a species of salmon. It came up from the sea, and its further ascent was blocked by the falls at Fort Smith.

The bishop had not been at Great Bear lake, but from reports of Fathers Petitot, O.M.I., and Ducot, O.M.I., he knew that the lake was immense and abounding in fish. There was an abundance of a small fish which he believed to be herring.

Along the Mackenzie river, separated by a chain of mountains, running in the same direction as the great river, a succession of beautiful and magnificent great lakes, full of fish, was found. They had named them Pius IX., Demazenod and Taché. These were the three largest lakes. The bishop had crossed them in winter from Fort Good Hope to Fort Norman..

Lakes were innumerable in the basin of the Great Mackenzie, and nearly all of them abounded in fish of different kinds. The regions east, northeast, and north, above all, abounded in lakes of all sizes, and were very rich in fish. Lake Athabaska furnished a very great quantity of whitefish, of small and large salmon trout, of pike, of pickerel, of carp, of large loches, &c. The whitefish weighed at least three pounds; the small trout from four to ten; the large trout from 10 to 35 pounds; the pike from 4 to 20 pounds; the carp the same. In Clear lake, pike were caught weighing from 25 to 35 pounds. Whitefish, pike, pickerel, carp and trout, were caught in nets in which the meshes were four and a half inches in size. The pike and trout were taken altogether with hooks. Nets were set in summer, in winter, or at any time. When the ice was four or five feet thick they made holes in places and set lines under the ice, and the same in most of the lakes, as necessity might require. During thirty years that the bishop had been in the country he did not believe that the fish had diminished at all. The population being so sparse and the lakes and rivers being so numerous, the fish increased more quickly than they could be caught. He regarded as certain that the general Government of Canada could derive a good deal of profit from the fisheries in the basin of the Mackenzie. These would be a resource almost incalculable. The Great Slave lake produced the same species of fish that the Great Athabaska lake did, and also in much greater quantity. They find there, besides, also the inconnu, a species of salmon which came from the Arctic ocean. It was undeniable that it comes from the sea. It was found all the way up the Mackenzie as far north as the river at Fort Smith. There the rapids and the cascades prevented it ascending higher. It was a beautiful and fine fish—the shape of the whitefish, but much larger. It weighed from 8 to 30 pounds.

The Mackenzie river, where it leaves Great Slave lake, the mouths of the Athabaska, Peace, Salt and Great Slave Lake rivers were places where the imperial birds (outardes), the grey goose, and the white goose, large and small, and the swan, prefer to stop to fatten themselves. They were there in such numbers sometimes in the spring and the autumn that one could hardly sleep when you camp near them. This was particularly so in the west part of Lake Athabaska and in the meadows and level places in the neighbourhood and on the borders of Lake Clear, where these fowl were abundant, as well as ducks of all kinds. These fowl remained there nearly six weeks each spring and as long in the autumn. The ducks passed all summer there. The outardes, the grey goose, white goose (large and small) swans, ducks of numerous species and varieties are of great value and constitute the greater part of the people's food in the spring and the autumn. These fowl are very numerous. The number of them is incalculable.

At Little lake, a few miles from Providence mission, the mouth of Salt river, and the mouth or the confluence of the Hare Skin river, Arctic circle, and in fact on the shores of Hudson bay and the Arctic sea, these fowl passed the summer. The geese and outardes lived on the sand banks or the gravel beds along the rivers, and about the lakes and in the submerged prairies, or prairies which had been submerged. When these fowl reached the country either from the north or south they were thin, but after fifteen days they commenced to be very fat, and before their departure they were still more so.

The bishop could not remember exactly when the birds reached the vicinity in the spring. The swans arrived first and were the last to leave. The outardes, geese and ducks reached Providence in the spring from April 8 to 15. They returned afterwards just before the ice took, in the first weeks of October. Naturally they arrived a little later at the north and in returning were from 8 to 15 days later.

Portage la Loche or Methye Portage, about 275 miles north of Battleford, is on the old canoe route some 3000 odd miles in length from Montreal to Fort Chipewyan, on Lake Athabaska. The above is a reproduction of the drawing by Sir George Back in 1825 of the famous view from this portage and this drawing is stated by Sir John Franklin to give accurately a beautiful delineation of one of the most picturesque scenes in the northern part of America.

Reindeer abounded generally in the part of the country north and northeast of the Great Slave lake.

MINERALS.

Bishop Clut explained that there was gold in the sand banks of the Peace river and in considerable quantities; but during the winter and in high water it could not be mined. The miners made there from $15 to $20 per day.

There was copper, and on the Coppermine river it was found in great pieces. Witness had seen little crosses made of it by the savages themselves when they were not able to have other metal. Sulphur abounded in several places. The bishop had seen it on the Clearwater river and above all on the west bank of the Great Slave lake. It is there in such quantities that the odour is annoying to those who pass by. Travellers have to keep their mouths shut to avoid inhaling the fumes. Near Fort Smith there was a salt mine which was probably the most beautiful and the most abundant in the universe. There was there a veritable mountain of salt. By digging a little on the earth, from six inches to a foot, perfectly pure rock salt could be found there. In addition to that there were salt springs, where, during the winter, the salt ran from these springs and formed little hills of salt. You had only to shovel and you could gather a fine salt, pure and clean.

On the margins of the Peace river, stones are found which are sufficiently precious to make trinkets of them. Witness had seen gypsum along the Mackenzie a little below Fort Norman.

Asked if he had ever heard of the existence of valuable minerals in any part of the barren grounds northeast of Lake Athabaska, Bishop Clut explained that he saw a man named McCarthy, at Fond du Lac, Lake Athabaska, who told him that he had discovered gold, but as he was not an educated man, the bishop did not know whether he was mistaken or not. The man said he would not show it to anybody, but that he was almost sure that he had found a gold mine. Nobody had brought to him specimens of gold, silver or anything of that kind from that region.

In the Peace river and the Liard river, certainly there was gold in large quantities. It was found in the sand bars, and the bishop fancied that mines would be discovered in the Rocky mountains and that the gold was carried from that part the same as in British Columbia, on the other side of the mountains. He imagined therefore, that there were considerable veins of gold in the Rocky mountains. On the Peace river twelve or thirteen years previously miners made from $15 to $20 a day washing, but in the winter and when the water was high they could not work, and they abandoned the mines. Gold was found in the sand bars on the Peace and on the Liard rivers. If the country were settled those mines might be worked to better advantage, because the miners could find other occupation in the winter and when the water was high. Certainly if a railway were constructed to the mines on the Peace river or the confluence of the Peace river and the Athabaska, the Dominion would derive great advantage from the forests, mines, fisheries and furs.

CLIMATE.

The months of June, July and August were generally very warm, but there was not sufficient rain. The drought injured crops. If they could have during these months two or three good rains the harvest would be good, that is if the rain should not be cold as it sometimes was and as the bishop observed it.

During these three months of summer they had sometimes white frosts, which sometimes did a great deal of damage to the crops. If the north wind blew with violence for two, three or four days, these frosts were sometimes general. After these north winds, if there was a calm and they had a clear sky, frosts were certain. If the north wind was not very strong the frosts were but local.

It was certain, that if this country became settled and cultivated on a large scale, frosts would be much less frequent. That was the result which they had already observed at their principal posts: the more they cleared to any extent the less were the fields susceptible to frost.

Rains did not commence until towards the end of July, but as he had already said generally, they had but few rains.

The months of September and October were generally dry, and the blue sky made them charming. In general they had a clear sky without a cloud and in winter and in summer that is what makes the climate so healthy in the basin of the Mackenzie. If they had a sufficiently large quantity of provisions, people could live there to a greater age than in any other part of the globe.

The climate in general was very rigorous in winter. It became extremely cold, but at the return of spring it was very warm, and the days being very long, vegetation thrived very quickly.

In the basins of the rivers Athabaska, Clearwater, Peace and Liard the bishop believes that if those countries were colonized, the white frosts which occurred there sometimes during the summer would become more rare, and the settlers would be well able to live there if means of communication were furnished them.

The great lakes and the great rivers exercised in effect a great influence to prevent white frosts in summer, and to delay the frosts in autumn. The priests had observed that it was only about the lakes and along the great rivers that the crops and the harvests ripened. In the interior of the country the white frosts were a good deal more frequent. So long as the country was not cleared and colonized it was useless to sow seed far from the lakes and rivers. The rivers of the basin of the Mackenzie, having in general a strong current, became frozen relatively late, and the ice broke up relatively earlier also. The rivers Athabaska, Peace and Liard began to lose the ice during the month of May. The Mackenzie was free from ice at the end of May. The ice only took on the large rivers in October, and the Great Athabaska lake until towards the end of October, and the Great Slave lake, being much larger in extent, did not close until much later than Athabaska lake. The ice disappeared in the latter between June 10 and 20; on the Great Slave lake between June 15 and 30. In a voyage which the bishop took from Fort Rae to Fort Resolution he was not obliged to leave the ice until July 3. He was unable to speak personally of the Great Bear lake. It remains just a month clear of ice. The Mackenzie river between Fort Simpson and Fort Good Hope was free from ice in the latter part of May.

The most frequent winds are those from the east and west, in winter especially. The winds from the west and south are good for the crops. That from the north is always cold. Even in summer if the north wind blows a little strong for two or three days it brings sometimes snow or white frost. The mid-day wind and the south wind are the warmest in the summer season.

At the Polar circle the southwest Chinook wind often made its effect felt, even in winter. The Rev. Father Séguin and Brother Kearney, who had been at Good Hope for 28 years had observed its effect. The bishop had observed it also himself during the winters of 1885 and 1886. This wind modified the temperature a good deal.

The missionaries had not remarked that the intensity of the frost had any effect on the natural trees of the country.

The bishop had not kept account himself of the degrees of heat in summer, but he was able to say that it was excessively hot; and the further one went towards the north the warmer he finds it becoming; and that heat lasted the 24 hours of the day without sensibly diminishing in its intensity from 10 p.m. to 3 a.m.

MEANS OF COMMUNICATION.

Bishop Clut described the Mackenzie as the finest river in the world for its length, its depth and also its navigation in summer. Steamers leaving Fort Smith crossed the

Great Slave lake and could descend as far as the Arctic sea. They could also ascend Peel river. The Mackenzie, which he had travelled upon very frequently, was a good deal larger than the St. Lawrence in depth and in the volume of its water.

At Fort Simpson, from May 20 to 25, the Mackenzie opened, and barques and small steamers could descend the river, certainly to Fort Good Hope, and probably to Point Separation. The bishop was not able to say if at this time it was possible to descend farther. He doubted it because there was low water. From the mouth of the Mackenzie, at least from Point Separation to the Great Slave lake, the navigation was open to the end of September. He made that journey himself once and arrived at his residence, La Providence, within 30 miles of Great Slave lake, on October 8, in a little skiff.

Great Slave lake was a very large and fine lake, very well suited for navigation. The north and northeast parts of it were filled with myriads of islands—there were millions of them. There were several immense bays running very far into the interior of the country and nearly every part of the lake and the bays could be visited by steamers.

Athabaska lake, he said, was a magnificent lake and very suitable for navigation for all kinds of steamers. The lake being very large, naturally it would require steamers drawing a considerable depth of water to make the most of the navigation.

Bear Lake river, which discharged the waters of the lake of the same name, he said, was navigable for barques a little flat. Its current was enough to make one giddy. The lake also would be navigable, but it was not for any length of time free from ice.

INFORMATION FURNISHED BY FRANK OLIVER, ESQ.

Some interesting information was communicated to the committee in writing by Mr. Frank Oliver, editor of the 'Bulletin,' and now (1908) Minister of the Interior in the Dominion Cabinet.

Mr. Oliver explained that the information communicated was chiefly acquired from Murdock McLeod, of Edmonton, who spent the years 1862-63 and part of '64 in the Hudson Bay Company service at Fort Anderson, since abandoned, east of the Mackenzie and about eighty miles up the Anderson river from the Arctic coast. In the summer of 1863 he accompanied an expedition undertaken on behalf of the Smithsonian Institute, along the Arctic coast from the mouth of the Mackenzie to that of the Coppermine river. In 1865 he was at Fort Liard.

AGRICULTURE.

Successive years of experiment had demonstrated the practicability of the growth of wheat, barley, oats and potatoes, at Dunvegan, Vermillion and Chippewyan, the two latter in latitude 58½. Mr. McLeod stated that in the summer of 1865, while in the Hudson Bay employ, at Fort Liard, latitude 59¾, he sowed about three acres of wheat on May 26; this was in the stock on August 1. It was good grain, though somewhat smutty, and had not been frosted; barley sowed at the same time did equally well, also potatoes.

During several summers' residence at Fort Liard, Mr. McLeod never saw summer frost. He also stated that at Fort Simpson, in latitude 62½, wheat, barley, potatoes had done well. This was borne out by the statement of Rev. Mr. Spendlove, missionary at Fort Simpson, except that in 1887 the barley was frosted.

Captain Smith, who built and sailed the Hudson Bay steamers 'Graham' and 'Wrigley,' and sailed the latter to within 100 miles of the Arctic ocean in 1887, stated that at Salt river, latitude 61½, were small settlements of half-breeds, who had horses and cattle and grew barley, wheat and potatoes. He had seen potatoes and barley growing as far north as Fort Good Hope, on the Mackenzie, north of the Arctic circle.

Berries of various kinds were the only considerable natural food product of the Mackenzie river country. They were plentiful in their season throughout the whole of the wooded region which extended to within 100 miles of the Arctic coast. The blueberry was the most plentiful and was found throughout the whole region. It resembled the huckleberry of the east. The blackberry and mossberry come next in quantity in the far north. The former was not the blackberry of Ontario, and the latter somewhat resembled the strawberry. From the Liard river south to the Saskatchewan, the raspberry, strawberry, Saskatoon berry, gooseberry, high and low bush cranberry, chokeberry, and black and red currant flourished as well, besides numerous minor varieties of berries. The Peace river country was especially noted for its abundant supply of berries of excellent quality. Although berries of all the kinds mentioned were plentiful in the Upper Saskatchewan, Indians used formerly to travel to Peace river, some 250 miles, to avail themselves of the supply there. In some years berries were much more plentiful than in others. In plentiful years they formed an important item of the Indians' food. There was every reason to believe that the varieties found there which were cultivated profitably in other countries could be as satisfactorily cultivated there, at least from the 61st parallel southward, between the main streams of the Mackenzie and the Rocky mountains.

FISH, FUR AND GAME.

Fish abounded in all the lakes of running water, and the fisheries of Lake Athabaska, Great Slave and Great Bear were at least as valuable as those of the St. Lawrence channel, while thousands of smaller lakes, especially east of the Mackenzie, were stocked with fish as well. The available fish supply alone was more than sufficient to supply ten times the then population of the Mackenzie region.

The musk ox inhabited the barren grounds, which occupy the immense triangle northeastward of the Mackenzie basin to the shores of Hudson bay and the Arctic ocean. A bull which Mr. McLeod helped to kill weighed 1,400 pounds, dressed, and the robe measured 15 feet from nose to rump. They were found generally in bands of ten to forty. Some winters they were more scarce than others; why could not be explained. The jumping deer, sometimes erroneously called the reindeer, was the principal food of the Indians and Esquimaux who inhabited the outskirts of the barren grounds. They were found in herds of thousands and were killed chiefly while crossing streams or the narrows of lakes in their migrations. The killing was done by men in canoes armed with spears.

The moose was found all over the forest region to the edge of, but not going into the barren grounds. They were most plentiful in the hard region west of the Mackenzie and went in small herds of six or a dozen.

The elk ranged in the same country as the moose, but not quite so far east or north.

The wood buffalo existed in small numbers in the open country between the Lower Peace and the Great Slave Lake rivers, extending westward from Great Slave Lake river about Salt river, in lat. 60, and also between the Peace and the Athabaska.

The beaver was found all over the wooded country, but was not very plentiful far north.

Water-fowl were plentiful beyond conception in the northern lakes of the Mackenzie basin and on the Arctic coast in the summer season, and furnished abundance of food to the Indians while they remained.

COMMUNICATION FROM UNITED STATES CONSUL JAMES W. TAYLOR.

A most interesting communication was read to the select committee of the Senate on April 19, from James W. Taylor, Esq., for many years United States consul at Winnipeg. Mr. Taylor always devoted much intelligent attention to the questions of

the natural resources of Canada's great western country, and his communication in question is still such a useful contribution towards the literature of the subject under discussion, that it is given herewith in full:—

UNITED STATES CONSULATE, WINNIPEG, APRIL 14, 1888.

Hon. J. SCHULTZ, Ottawa.

SIR,—I have received the elaborate series of interrogations upon the 'Resources of the Great Mackenzie basin,' propounded by a committee of the Senate of Canada, with your intimation, as chairman, that any response which I am enabled to make will be indulgently considered by your colleagues of the committee. My personal experience is too limited for me to undertake more than a general expression of opinion, founded upon careful investigation of the extensive literature relating to the subjects of the food products and other resources of Central and Western Canada.

The results of the inquiry at a previous session of the Dominion parliament upon the 'Natural food products of the Great Northwestern area of the continent' were so satisfactory—being in many respects quite in the nature of discoveries—that I am not surprised at the further investigation now in progress into the mineral and other resources of the sub-arctic district of the Mackenzie basin, and I will venture to express the hope and belief that the government of the United States will follow the territorial organization of Alaska, soon to be consummated, by the appointment of Commissioners, not only to assist in the determination of the boundaries, but further to co-operate with the Canadian government in the important investigations which occupy the attention of the committees of the Dominion Senate.

Let us first consider the range that these inquiries take geographically. Open the map of North America and trace the area inclosed between longitudes 100 and 170 west of Greenwich, and latitudes 50 to 70—a fourth of the continent—embracing the Canadian provinces, present and prospective, of Manitoba, Assiniboia, Alberta, Saskatchewan, Athabaska and British Columbia, and the American territory and the future state of Alaska.

A GLANCE FORWARD.

How little conception have we from present developments, of what the twentieth century will witness over this vast realm of nature. It will assist our prophetic vision to compare a less area on the map of Europe identical in climate and other natural manifestations.

Trace 60 degress of longitude—50 east and 10 west of Greenwich—and from lat. 55 to 70, and mark the relations of man to earth. The European parallelogram of 15 degrees of latitude to 60 of longitude (the American division is 20 to 70) includes Scotland, Denmark, Norway, Sweden, Finland. Lapland and the northern moiety of Russia in Europe, represented by the cities of Glasgow, Edinburgh, Bergen, Copenhagen, Stockholm, St. Petersburgh, Moscow, Nijni, Novgorod, Karan and Archangel.

Of this great north land of Europe, especially its eastern and continental division, I may be permitted to repeat my own language, published at Columbus, Ohio, in 1856. 'The northern limit of rye is 65 degrees, of barley 67 degrees, and oats even further north. Wheat is cultivated in Norway to Drontheim, latitude 64 degrees, in Sweden to latitude 60° 51′, while in Central Russia the limit of wheat cultivation appears to coincide with the parallel of 58 to 59 degrees.

It is well understood that the growth of the cerealia and of most useful vegetables depends chiefly on the intensity and duration of the summer heats, and is comparatively little influenced by the severity of the winter cold or the lowness of the mean temperature of the year. In Russia, as well as in Central America, the summer heats are as remarkable as the winter cold. The northern shore of Lake Huron has the mean summer heat of Bordeaux in southern France, or 70 degrees, Fahrenheit, and Cumberland House on the Saskatchewan exceeds in this respect Brussels or Paris.'

I can add nothing to the demonstration by innumerable explorations and reports, that the navigable channels of the Mackenzie and the Mississippi are connected by a territory of 1,500 miles in extent, northwest of St. Paul, Minnesota, having an average width of 900 miles (1,200,000 square miles), which is substantially identical in climate and natural resources.

THE HABITAT OF A FLOWER.

There is a great variety of illustrations, but I shall limit myself to a flower. The prairie's firstling of the spring has the popular designation of 'crocus,' but it is an anemone—Patens, the purple anemone, the word flower, but I prefer the children's name suggested by its soft furry coat, the 'gosling' flower—which, with its delicate lavendar petals, is fully ten days in advance of other venturesome spring blossoms. It is often gathered on the Mississippi bluffs, near the Falls of St. Anthony, April 15. It appears simultaneously on the dry elevation near Winnipeg. It was observed even earlier, on April 13, during the Saskatchewan campaign of 1885, and is reported by Major Butler, in his 'Wild North Land,' as in profusion on Peace river, 1,500 miles from St. Paul, on April 26. Even 1,000 miles beyond, on the Yukon, within the Arctic circle, Archdeacon Macdonald, a missionary of the Church of England, has gathered the flower on May 14.

Equally significant as this delicate herald of the spring, are the records of ice obstruction in rivers—their emancipation being simultaneous from Fort Snelling, Minn., to Fort Vermillion, Athabaska.

Appreciating highly the scope and value of the Parliamentary Commission whose circular has called for the above acknowledgment, I will venture to repeat the results of a special inquiry into the capacity for colonization of the valleys of the Athabaska and Peace rivers between latitudes 54 and 60 and longitudes 110 and 120 and an additional block of territory on the headwaters of the Liard river from latitude 57 to 60 and longitude 120 to 125; these streams being the most southern tributaries and indeed the sources of the Great Mackenzie.

The southern moiety has been carefully explored by Prof. George M. Dawson, of the Canadian Geological Survey, and is properly called Athabaska as comprising most of the affluents of the river of that name. He estimates its area as about 31,550 square miles, and adds that 'by far the largest part may be classed as fertile, with an average elevation above the sea of little over 2,000 feet.'

FAR WESTERN AGRICULTURE.

In respect to the Peace river the ascertained facts leave no doubt on the sufficient length and warmth of the season to ripen wheat, oats and barley, with all the ordinary root crops and vegetables. The whole region is characterized by Archbishop Taché of St. Boniface in his 'Sketch of Northern America,' in terms far more favourable than he employs with reference to the Southern Saskatchewan districts. He speaks of 'a fertile country very well suited to colonization,' on the Athabaska, and remarks that the valley watered by the Peace river 'cannot but become peopled.'

Even more specific has been the testimony of early traders and travellers.

Sir Alexander Mackenzie, as far back as 1787, saw at a trading station of Peter Pond, on the Elk or Athabaska river, 'as fine a kitchen garden as he ever saw in Canada.'

Mr. William McMurray, an officer of the Hudson Bay Company, informed me that at post established by him in latitude 56, longitude 111, he obtained good crops of wheat, barley, oats and all garden vegetables.

Sir John Richardson states that wheat is raised with profit at Fort Liard, latitude 60 degrees five minutes and longitude 122° 30′, but with an elevation above the sea of only 400 or 500 feet; while Mr. Robert Campbell, a retired officer of the Hudson Bay Company, who founded Fort Halkett, nearer the Rocky mountains in the valley of the Liard river, reports an experiment of cultivation equally successful.

A GARDEN AT THE CHURCH OF ENGLAND MISSION SCHOOL, AT HAY RIVER, SLAVE LAKE. POTATOES ARE GROWN AS FAR NORTH AS FORT GOOD HOPE, NEAR THE ARCTIC CIRCLE.

When, therefore, in 1879, I became solicitous, in answer to hostile criticism in influential quarters, to remove all reasonable doubt of the comparative mean temperatures at the interior points of Central British America and my inferences therefrom in respect to the extension north and west of cereal production, I communicated with Rev. A. C. Garrioch in charge of a mission farm of the Church of England at Fort Vermillion on Peace river, latitude 59, longitude 116; with Richard Hardisty, Esq., long an officer in charge of Fort Edmonton on the Saskatchewan river in about latitude 54, longitude 114, and P. F. Laurie, Esq., editor of the Saskatchewan Herald at Battleford, in latitude 53, longitude 109, and received and was able to distribute most satisfactory samples of wheat, barley, oats and pease from the localities of the crop of 1880.

PEACE RIVER GRAIN.

In respect to the Peace river grains, I beg leave to communicate some explanations communicated to me by Mr. Garrioch. 'The wheat sent you,' he wrote, 'does not do justice to Peace river, for the summer last year was a most unfavourable one, the rainfall being double what we have during an ordinary season, the consequence of which was that the straw grew too rank and the wheat from which my sample was taken lay on the ground under drenching rains for some time after it had been cut until it was partially damaged. At any rate I have never known poorer wheat raised in Peace river than we had last year.'

A better sample sent by Mr. Garrioch was from a mission station on Peace river opposite the junction of the Smoky river, nearer the Rocky mountains and in a situation of greater altitude than Fort Vermillion, but 200 miles west a locality 1,500 miles northwest of St. Paul or about two thousand miles from Chicago. Of a package of barley—a hulless variety, the seed of which was from Holland, from Fort Vermillion of Peace river, Mr. Garrioch wrote; 'For the barley no apology is needed. I gave the Roman Catholic priest at this place a bushel of it this spring, and wishing to be on the safe side, weighed out 50 lbs., but on coming to put it in his bushel measure, there was about two inches more required to make the proper bulk.'

In corroboration of these specific statements, I find in the 'Mission Field' of January 2, 1882, a London monthly publication of the Society for the Propagation of the Gospel, an abstract of a report of the Right Rev. W. Bompas, Bishop of the Church of England in the Athabaska and Mackenzie districts—(his diocese comprising the centre Arctic watershed of British America), of which the following extracts are pertinent:—

'The excellence of the land in the Peace river country for farming purposes is well known; the soil is rich and productive, and the climate most salubrious.' A mission station is established at Fort Vermillion under the charge of the Rev. Arthur Garrioch and a church is fast approaching completion. Other mission stations have been started at different parts of the river, and in 1878 a mission farm was begun which the bishop hopes will in time obviate the necessity of procuring all the supplies of flour, &c., from Red river, the expense of which, from heavy freights, is so great that every bag of flour by the time it reaches the missionaries north of Athabaska costs upwards of £5.

But even more remarkable is the bishop's testimony of the cultivation at Fort Simpson on the Mackenzie river in lat 61:50. 'The English schoolmaster at Simpson,' he adds, 'has made successful experiments of farming in that northern region, and through his energetic labours a good crop of barley was raised in the mission fields; also some wheat and potatoes, beans, pease, beet roots and other vegetables.'

REASONS FOR NORTHERN FERTILITY.

I will now endeavour in a few words to indicate the causes, in my judgment, for this remarkable northwestern extension of cereal productions.

1. Reduced Altitude.—The Union Pacific railroad crosses the dome of the continent near latitude 40, with its highest elevation, Mt. Sherman, of 8,000 feet, and with an average of 5,000 feet for fifty miles eastward from the Rocky mountains. This piedmont on the route of the Northern Pacific, in or near latitude 47, in Montana, is reduced to an average of 4,000 feet; on the south branch of the Saskatchewan, in latitude 51, for 3,000 feet; in the Athabaska district, latitude 55, to 2,000 feet, and in the valleys of the Peace and Liard rivers, latitudes 56 to 60, to 1,000 feet—until, subsiding northeastwardly, the plains connect with the navigable channel of the Mackenzie at an elevation of only 300 feet above the Arctic ocean. This difference of altitude is equivalent to 13 degrees of latitude, considered climatically.

2. Pacific Winds.—The Utah basin, a plateau 800 miles in width, at an elevation of 5,000 feet, between the Rocky mountains and the Sierra Nevadas, making a total mountain barrier of 1,400 miles, excludes the moisture of Pacific winds from the central areas of the continent, while the interlocking valleys of the Columbia and the Missouri, on the route of the Northern Pacific Railroad, and of the Fraser and the Columbia rivers with the Saskatchewan, on the route of the Canadian Pacific, facilitate the ingress and ameliorating influence of the Chinook or West wind of the Pacific coast to the eastern piedmont of Montana, Alberta and Saskatchewan; but it is only in latitude 55 to 60 that the remarkable physical effects occur of the Peace and Liard rivers rising in the western slope of the Rocky mountains and breaking through its barrier on their courses to the Mackenzie, after interlocking at their sources with the Skeena and the Stickeen.

3. Summer Moisture.—As a corollary to the foregoing facts of reduced altitude, and the inter-collation of the Pacific moisture, I am satisfied that there is no necessity of irrigation north of latitude 50. In the north Saskatchewan, Athabaska and Peace river districts there is much evidence that the summer rainfalls, without being excessive, still exceed the average of Manitoba and Minnesota.

QUESTION OF SOLAR HEAT.

4. Solar Heat.—On this subject I avail myself of a very intelligent statement of Prof. G. M. Dawson, of the Canadian Geological Survey:—'In addition to the favourable climatic conditions indicated by the thermometer, the length of the day in summer in the higher northern latitudes favours the rapid and vigorous growth of vegetation, and takes the place, to a certain extent, of heat, in this respect.' This has been supposed to be the case from the luxuriance of vegetation of some northern regions, but Alphonse de Candolle has put the matter beyond doubt by subjecting it to direct experiment. In latitude 56 degrees, which may be taken as representing much of the Peace river country, sunrise occurs on June 20 at three hours, twelve minutes; sunset at eight hours and fifty minutes; while six degrees further south in lat. 50, which may be assumed to represent Manitoba, sunrise occurs on the same day at 3 hours 47 minutes, sunset at 8 hours 13 minutes; the duration of sunlight in the first place being 17 hours 38 minutes, in the second 16 hours 24 minutes, or one hour and a quarter in excess in the northern locality.

5. Maximum of Fructification.—Over the vast northwestern territory, reaching from St. Paul, in latitude 45, to Fort Liard, in latitude 60—a region of rigorous winters, cool, moist springs, and dry but intense summers—the undue luxuriance of the stem and foliage is checked in the first stage of growth, greatly to the advantage of the fruit and seed. This vigour given to vegetation in cold climates by the rapid increase and prolonged action of summer heat has been often observed, but has been formulated by Doctor Forry.

Samuel Forry, M.D., a physician and medical writer, born at Berlin, Pennsylvania, June 23, 1811, died November 8, 1844. He was graduated from the University of Pennsylvania in 1835. He was ten years in the United States army as assistant surgeon and was engaged in the Florida war, afterwards practised in New York city.

He contributed many articles to medical journals; originated and conducted for two years the 'New York Journal of Medicine,' and in 1844 received from Harvard University the Boylston prize for the best essay on the 'Protecting Power of Vaccine.' He published 'Climate of the United States and its endemic influences,' 8vo., N.Y., 1842; 'Meteorology,' New York, 1843—(Drake's Directory of American Biography.)

SUPERIORITY OF NORTHERN GROWN CROPS.

He states as a universal fact, 'that the cultivated plants yield the greatest products near the northernmost limit at which they will grow.'

His illustrations embrace nearly every plant known to commerce and used either for food or clothing.

Cotton, a tropical plant, yields the best staple in the temperate latitudes. Flax, hemp, &c., are cultivated through a great extent of latitude, but the lint, in southern latitudes forced into premature maturity, acquires neither consistency nor tenacity; and we must go far north in Europe to find these plants in perfection. Rice is tropical, yet Carolina and Florida grow the finest in the world. Indian corn is a subtropical plant, but it produces the heaviest crops near the northernmost limits of its range. In the West Indies it rises thirty feet high, but produces only a few grains on the bottom of a spongy cob, and is regarded only as a rough provender for cattle. In the rich lands of the middle states it will often produce 50 to 60 bushels to the acre, but in New York and in New England, agricultural societies have actually awarded premiums for 125 bushels to the acre. Wheat is a more certain crop in New York, in northern parts of Pennsylvania, and Ohio and the Baltic districts of Europe, than in the south either of Europe or America. In the spring it is not forced too rapidly into head before it has time to mature fully or concoct its farina. Oats grow in almost every country, but it is in northern regions only, or very moist or elevated tracts, that they fill with farina suitable for human sustenance. Rye, barley, buckwheat, millet, and other culmiferous plants might be adduced to illustrate the above principle, for all their habits require a more northern latitude than is necessary to their mere growth. The branches are in perfection only in northern or cool regions, although they will grow anywhere. It is in the north alone that we raise animals from meadows and are enabled to keep them fat and in good condition from hay and grass alone, without grain. It is there the grasses acquire succulence and consistency enough not only to mature animals but to make the richest butter and cheese. The grasses which do often in the south grow large enough are without richness and nutriment; in hay they have no substance, and when green are too marshy to fatten animals. The consequence is most animals in the east latitudes brouse from necessity and are poor and without size and beauty, which forces them to a rapid fructification before they have had time to concoct their juices. The tube-rose, bulbous, and other roots, cultivated for human and animal subsistence, are similarly affected by climate and manifest habits in corroboration of the above principle. The Irish potato, although from or near the tropics, will not come to perfection, but in northern or cool countries or in moist insular situations, as in Ireland. It is in such climates alone that its roots acquire a farinaceous consistence and are of size, flavour and nutriment enough to support in the eminent way in which they are susceptible, animal life. In the south a forcing sun brings the potato to fructification before the roots have had time to attain their proper qualifications for nourishment.'—(Extract from an article upon the 'Acclimating Principle of Plants,' in the American Journal of Geology).

NORTHERN AND SOUTHERN GROWN WHEAT.

So far, the suggestive illustrations of Dr. Forry, but I will venture to add a further instance. From the central wheat district of North America at its southern margin, in Southern Minnesota: seldom more than two well-formed grains are found in

each cluster or fasicle forming the row; in northern Minnesota, Dakota and Manitoba, free grains become habitual; and from heads of wheat brought to me from Prince Albert on the Saskatchewan and Fort Vermillion on the Peace river I have separated five well formed grains from each cluster or group forming the head, which, as I have had several occasions to remark, is a decisive evidence that the perfection of the wheat plant is attained near the most northern limit of its successful growth.

6. Fall ploughing for wheat.—I append to the foregoing summary of the successful conditions of wheat culture, a brief reference to the preparation of the soil, if not the sowing of wheat in the late autumn. The only instances of injury from frost are where invaluable time is lost in the spring by a neglect of the practice, now universal in Minnesota and Dakota, of fully preparing the ground for the seed in autumn, which can be supplemented with entire success in the Saskatchewan and other districts by sowing spring wheat subsequent to October 15. In 1880, Hon. A. G. B. Bannatyne, of Winnipeg, sowed all the varieties of spring wheat exhibited at the Provincial Fair of that year in his garden on November 2, none of which failed to germinate in the following spring (although a mild open winter would be fatal) and all were harvested by the 8th of August.

A COMPARISON WITH EUROPE.

The subject of animal development in high northern latitudes I will not undertake to discuss, but hope to be indulged in citing the experience of European Russia—especially in the districts north of Moscow—in respect to frosts. Neither the province of Manitoba nor the Northwest Territory of Canada, within latitude 60, present conditions more adverse than the interior of Russia, or the contiguous districts of Siberia and Central Asia, which are equivalent in latitude and other physical relations. To those regions, apples, pears, cherries and plums have been carried by civilized man in his migrations from milder climates northward, with gradual changes in the constitution of the trees, until the above named fruits are successfully grown at and beyond the latitude of Moscow, six degrees north of Winnipeg. Maltebrun describes a variety of apples grown at Kerusk as weighing four pounds, of a delicious flavour, and keeping a long time. Another variety of apples grown in the vicinity of Moscow, which was brought from China, is described as so transparent that, 'When held to the light, the seeds in it can be counted.' Adolph Erman, in his travels through Russia and Siberia in 1840, mentions with surprise that he found at Torxhok on the road from Moscow to St. Petersburg, north of latitude 57 and at Vladimix, north of 56 degrees, that apples and cherries of a superior kind were extensively grown and sold at moderate prices. Sir George Simpson, late Governor of the Hudson Bay Company, gives, in his overland journey around the world, an account of his visit to Burnarl in Siberia, which is north of the little Altai mountains and of northern China, and mentions the cultivation of apples there. In Dr. Clark's 'Travels in Norway and Sweden,' published in 1838, there is reference to the excellent apples, pears, plums, cherries and strawberries at Trondhgein in Norway in 63 degrees 20 minutes north.

In conclusion, I am sure that the Senate Committee, charged with such important interests, will pardon on my part an aspiration, often expressed, that every encouragement may be extended to the great natural commerce between the cotton zone of the United States, the corn zone verging upon the great St. Lawrence lakes, and the wheat zone ranging as far north as in Europe.

I am, sir, your obedient servant,

JAMES W. TAYLOR.

Spruce swamp in Peace River Valley, north of Vermilion.

EVIDENCE OF THE REV. J. GOUGH BRICK.

The Rev. J. Gough Brick, for many years in charge of the Church of England mission at Dunvegan on the Upper Peace river, submitted evidence in writing.

The reverend gentleman explained he went in to his mission via Winnipeg, the Red river, Lake Winnipeg, the North Saskatchewan to Fort Carlton, overland to Green lake, down the Beaver river to Isle a la Crosse, up a river whose name he did not know to the Long Portage over the height of land, down the Clearwater to Fort McMurray, down the Athabaska river to Fort Chippewyan, and up the Peace to Fort Dunvegan.

AGRICULTURE.

Witness did not think corn had ever come to maturity in the far Northwest. He had tried corn and it had just formed in the cob.

He had ploughed on April 8, and sown wheat on April 12, and that wheat was cut about August 20 at the mission, Dunvegan, Peace river.

Wheat was generally sown from April 12 to May 1, and harvested at the end of August. The barley was sown from the 10th to the 20th of May; and harvested at the end of August. The time for sowing and reaping oats was the same as wheat. Potatoes were planted about the 16th of May and dug in September. Turnips planted at same date were gathered 10th October.

The Hudson Bay Company had done a little farming, in connection with other posts, at Dunvegan, St. Johns, Hudson's Hope and Vermillion, for very many years. Witness supposed that at Dunvegan they had raised wheat, barley and potatoes for 75 to 100 years, and seldom had the crops turned out a total failure. In 1884 he went up on to the height of the prairie country, some thirty-six miles in Dunvegan, and broke up about 3 acres for an experiment. In 1885 the crop on the land, only once ploughed, was fairly good. In 1886 there was a magnificent crop of wheat, barley, peas, potatoes, turnips and all other vegetables. In 1887, he was sorry to say, the crop there was a total failure. A frost on July 26, killed out everything.

The ordinary prairie grasses, with wild vetches and pea-vine were found in abundance, growing more or less all over the country.

The soil was a black loam. A large percentage he considered fit for grain, the rest for pasturage.

They had no insect pests in the Upper Peace country.

The Indians were raising a considerable quantity of potatoes. A few were raising a little barley and wheat.

Strawberries, raspberries, the service berry and other wild small fruit grew in great abundance.

FORESTRY.

There were large wooded areas in the country, the trees, including spruce, juniper, poplar and white birch. They had good spruce, and could take out logs 70 feet long.

Strawberries, raspberries and the service berry grew in great abundance.

FISHERIES, FUR AND GAME.

There were a very few fish in Peace river, but good white fish in Lesser Slave lake.

The staple article of food of the Indians was the rabbit, when any were to be had, moose, bear, lynx, beaver, geese and ducks. There was usually an abundance of rabbits for three years; then they were three years without any. Witness thought there must be some disease to kill them off. When they got abundant they killed off

all the small brush or shrubs in the country. They certainly migrated, going to the southwest, and returning, coming from the north.

CLIMATE.

Witness considered the climate of the Upper Peace as the finest in the world.

The usual snowfall in Peace river is from 18 inches to three feet. Ice begins to run in the Peace river about November 5, but some seasons remains open until December 20. It generally breaks up about the 10th to the 15th of April.

The prevailing wind is from the southwest, and during the winter the Chinook winds prevail in the Upper Peace river country.

The three growing months are very dry until about the middle of July; then some seasons they get considerable rain. There were summer frosts some seasons; but still they were not as destructive in the Peace river country as further south. These frosts were purely local, and witness thought that were the county settled they would be less likely to occur. The early part of the summer is generally dry, while the weather in September and October is very pleasant, indeed.

EVIDENCE OF DR. GEORGE M. DAWSON, OF THE GEOLOGICAL SURVEY.

George M. Dawson, M.D., LL.D., Assistant Director of the Geological Survey of Canada, submitted a very complete series of answers to the schedule of inquiries set by the Senate Committee, and was also examined at length, orally. He explained that he had personal acquaintance with the Athabaska from the Landing to Baptiste river, with the Peace river valley from Smoky river to the headwaters and with the country between the above designated portions of rivers.

Quoting from a report he had prepared in 1879-80, on the extent of arable and pastoral lands in the region of the Peace and Athabaska rivers, Dr. Dawson showed that the Peace river basin comprised an area of about 31,550 square miles. Its average elevation may be stated as a little over 2,000 feet, and this is maintained with considerable uniformity, for though the general surface slopes slightly from the north and south toward the Peace river, the region as a whole may be considered as a plateau, through which the great gorge-like valley of the Peace has been excavated. This valley has in general a depth of 600 to 800 feet below that part of the plateau bordering it, with a width of two or three miles from rim to rim. Its tributary streams, at first nearly on the plateau level, flow in valleys of continually increasing depth as they approach that of the Peace river. Those from the southeastern portion of the region, rise either in the Rocky mountains or near the Athabaska, the tributaries received by the latter stream, in this part of its course, from the north and northwest being—with the exception of the Baptiste—quite inconsiderable.

A FERTILE SOIL.

The ridges and hills by which this region is occasionally diversified, appear in all cases to be composed either of the generally soft rocks of the cretaceous, or of arenaceous clays containing erratics and representing the boulder clays of the glacial period. These elevations are generally slight, and with exceedingly light and gradual slopes, the scarped banks of the streams constituting much more important irregularities. These ridges, however, often resemble detached portions of a higher plateau, and spread widely enough to occupy in the aggregate a considerable area, of which the soil is not so uniform in character as elsewhere. With these exceptions, the soil of the district may be described as a fine silt, resembling the white silts of the Nechacco basin, and not dissimilar from the loess-like material constituting the subsoil of the Red river valley

in Manitoba. This silt at a short distance below the surface, is greyish or brownish in colour, but becomes mixed superficially with a proportion of vegetable matter to a varying depth. It has evidently been deposited by a comparatively tranquil body of water not loaded with ice, probably toward the close of the glacial period, and has either never been laid down on the ridges and undulations above referred to, or has been since removed from them by processes of waste. As evidenced by the natural vegetation its fertility is great.

EXTENSIVE AREAS OF PRAIRIE.

West of the Smoky river, both to the south and north of Peace river, there are extensive areas of prairie country, either entirely open, and covered with a more or less luxuriant growth of grass, or dotted with patches of coppice and groves of trees.

The northern banks of the Peace river valley are also very generally open and grassed, and parts of the valley of the Smoky and other rivers have a similar character. The total area of prairie land west of the Smoky may be about 3,000 square miles.

Though the prairies are most immediately available, from an agricultural point of view, the regions now covered with second growth and forest, where the soil itself is not inferior, will eventually be equally valuable. The largest tract of poor land is that bordering the valley of the Athabaska on the north. This rises to an elevation considerably greater than most of the region to the north and west, and appears, during the submergence to which the superficial deposits are due, to have been exposed to stronger currents which have prevented the deposition of fine silt, causing it to be replaced by a coarser silt which passes in places into actual sand, and alternates with ridges of boulder clay. This region is often swampy, and for a width of twenty to twenty-five miles on the trail from Sturgeon lake to Athabaska is quite unsuited for agriculture, though still in many places capable of yielding good summer grazing when the forest has been completely removed by fire. To the northward, more particularly to the east of Smoky river, peaty and mossy swamps occupy part of the surface, and these may be regarded as permanently unsuited to agriculture.

There is also a sandy tract, though of small width, along the lower part of the Wapiti river near its junction with the Smoky. Deducting as far as possible, all the areas known to be inferior or useless, with about twenty per cent for the portions of the region under consideration of which less is known, the total area of land, with soil suited to agriculture, may be estimated as at least 23,500 square miles. In the absence of complete maps, such an estimate cannot be otherwise than very rough, but may serve to give some idea of the fact.

Under examination, being asked as to the natural agricultural food products of the region, Dr. Dawson stated that the service berry, high bush cranberry, swamp cranberry, raspberry, strawberry and various species of blueberry, were the only fruits sufficiently abundant to be of importance. The first mentioned was of more value as food than any of the others. It was extremely abundant in the Peace river country, particularly in the Grand Prairie.

FORESTRY.

The witness, after describing the prairie country in the Peace river district, showed that the remainder of the surface was generally occupied by second-growth forest, occasionally dense, but more often composed of aspen, birch and cottonwood, with a greater or less proportion of coniferous trees. Some patches of the original forest remained, however, particularly in the river valleys, and were composed of much larger trees, chiefly coniferous, among which the spruce was most abundant. Handsome groves of old and large cottonwoods were also to be found in some of the valleys. Where the soil became locally sandy and poor, and more particularly in some of the more elevated parts of the high ridges above described ,a thick growth of scrub pine

and spruce, in which the individual trees were small, was found, and in swamp regions the tamarack was not wanting, and grew generally intermixed with the spruce.

East of the Smoky river, and southward toward the Athabaska, the prairie country was quite insignificant in extent, the region being characterized by second growth forest, which was only beginning to struggle up.

Whatever theory be adopted, and may have been advanced to account for the wide prairies of the western portions of America further to the south, the origin of the prairies of the Peace river was sufficiently obvious, Dr. Dawson thought. There could be no doubt that they had been produced and were maintained by fires. The country was naturally a wooded one, and where fires had not run for a few years, young trees began rapidly to spring up. The fires were, of course, ultimately attributable to human agency, and it was probable that before the country was inhabited by the Indians it was everywhere densely forest-clad. That the date of the origin of the chief prairie tracts now found is remote, was clearly evidenced by their present appearance, and more particularly by the fact that they were everywhere scored and rutted with old buffalo tracks, while every suitable locality was pitted with saucer-shaped 'buffalo wallows.' In its primitive state, the surface was probably covered with a dense and heavy growth of coniferous trees, principally the spruce (*Picea Engelmanni and P. alba*), but with scrub pine (*Pinus contorta*) in some localities, and interspersed with aspen and cottonwood. These forests having been destroyed by fire, a second growth, chiefly of aspen, but with much birch in some places, and almost everywhere a certain proportion of coniferous trees—chiefly spruce—had taken its place. The aspen being a short-lived tree, while the spruce reached a great age and size, the natural course of events, if undisturbed, would lead to the re-establishment of the old spruce forests.

With regard to the timber further north, along the Mackenzie, Dr. Dawson stated that Richardson had described the white spruce as attaining a girth of four or five feet, and a height of 60 feet in the Mackenzie valley as far north as Bear Lake river. One tree in that locality measured 122 feet in height. It appeared that the white spruce was the most abundant tree throughout the Mackenzie valley, and its wood was fairly good for all constructive purposes.

FISHERIES, FUR AND GAME.

The supply of fish in all the waters of the Peace river and Mackenzie river basins was very large. In all the waters tributary to the Mackenzie, the Arctic grayling, or Back's grayling, which is an excellent fish, was to be found. It is a fish resembling the trout in appearance and size, but has a very large back fin. It is a very game fish, very much like the trout, takes the fly and is excellent eating. That fish, witness found in the headwaters of the Mackenzie, as far up as the very source of the Peace river, and also of the Liard river, and it also occurred in the Yukon to its headwaters. It is a purely fresh water fish, and a two-pounder would be a fair sized one.

MINERALS.

The witness was disposed to think that the fine gold found in the rivers had come from the north and east with the boulder drift.

The pitch found along the Athabaska may probably be of considerable value in the future; but in the meantime was most important as giving reason to believe that extensive deposits of petroleum existed in the country in which it occurred. The quantity appeared to be practically inexhaustible.

As to the barren lands between Lake Athabaska and the Arctic sea, it was a fact that an immense district—nearly half a million square miles of country—was, except along its watercourses, as utterly unknown as the interior of Africa. The Coppermine river runs through the barren lands and so does Back's Great Fish river, on which there are mineral indications. There is every reason to believe that there is a repetition

THE MACKENZIE FORESTS, BURNED DOWN BY HUNTERS "TO IMPROVE THE HUNTING."

along the Coppermine river, and in its vicinity of those rocks which contain copper, on Lake Superior, and which have proved so rich there. At the time it seemed to be beyond the reach of the prospector. The Hudson Bay Company sent Hearne up there in the latter part of the last century to discover where the copper found in the hands of the natives came from, but he could do nothing but report that he found copper there. The sea to the north was ice-bound, so he did not see his way to utlizing it. Hearne travelled the barren grounds more than anyone else, but he was not a scientific explorer. He travelled with the Indians in winter under circumstances of great hardship, and Dr. Dawson said he believed we had not yet got sufficient information up to that date about these 'barren grounds.' What mineral discoveries might be made there it was impossible to say.

CLIMATE.

The luxuriance of the natural vegetation in the Peace valley prairies was truly wonderful, and indicated, not alone the fertility of the soil, but the occurrence of a sufficient rainfall.

It may be stated at once, Dr. Dawson stated, that the ascertained facts left no doubt on the subject of the sufficient length and warmth of the season, to ripen wheat, oats and barley, with all the ordinary root crops and vegetables, the only point which might admit of question being to what extent the occurrence of late and early frosts might interfere with growth. This remark was intended to apply to the whole district previously defined, including both the river valleys and the plateau.

The summer season of 1879 was an unusual one, characterized by excessively heavy rainfall, with cold raw weather in the early summer months. These conditions did not extend to the west of the Rocky mountains, but appeared to have been felt over the entire area of the plains to the Red River valley. As a result of this, the crops generally throughout the Northwest were later than usual, and the mean temperature of even the latter part of the summer appears to be rather abnormally low. Notwithstanding this, on Dr. Dawson's arrival at Dunvegan, on August 16, small patches of wheat and barley in the garden of the fort presented a remarkably fine appearance and were beginning to turn yellow. On his return to the fort on August 31, these were being harvested, their complete ripening having been delayed by overcast and chilly weather which prevailed between these dates. At the first-mentioned date potatoes were quite ripe, with the balls formed on the stalks, and the garden contained also fine cabbages, cauliflowers, beets, carrots, onions, lettuce and turnips. Dwarf beans, cucumbers and squashes were also flourishing, and though these plants are particularly tender, showed no signs of frost. The two last-named, having been sown in the open ground, did not appear likely to perfect their fruit. A few stalks of Indian corn were also growing, though it is improbable that this cereal would ripen in this district. When this garden was again visited, on the last day of August, the beans, cucumbers, and squashes had been cut down by frost, but not completely killed. The potato tops were also slightly nipped.

Rev. Mr. Tessier, who had been at Dunvegan as a missionary for some years, had always been able to ripen small, black butter beans, but in some seasons not without difficulty, owing to frosts. He had also tried a few grains of oats, which he procured accidentally, and obtained a return of astonishing abundance. About the date just referred to, the potato plants of Smoky river post (The Forks) were badly cut down by frost, the tubers being, however, quite ripe, fine and large.

From information obtained at Dunvegan, it seemed that the snow disappeared about the middle of April, westerly winds sweeping it away fast. The river opened at about the same time, cultivation began at about the end of April or May 1. The river generally began to freeze in November. The depth of snow, Dr. Dawson was told, averaged about two feet.

HORSES AND CATTLE WINTER OUT.

Mr. Horetzky had been told that the plains were often nearly bare up to the month of December, though the winter usually set in with the month of November. Sir Alexander Mackenzie remarked the same absence of snow in the early winter months of 1792. It was entirely gone on April 5, 1793, and gnats and mosquitoes were troublesome on April 20. Horses almost invariably wintered out well without requiring to be fed. Hay should be provided for cattle, to ensure perfect safety, for a period of three or four months, though in some seasons it was necessary to feed the animals for a few weeks only. The Indians of the 'Cree Settlement' on Sturgeon lake wintered their horses without any difficulty round the borders of a neighbouring lake, the shores of which were partly open. From Hudson's Hope, the horses were sent southward to Moberley's lake to winter, and according to Mr. Selwyn, did well there. Lesser Slave lake, with its wonderful natural meadows, had long been known as an excellent place for wintering stock, and was referred to as such by Sir J. Richardson.

From such comparison as could be made, it would be premature to allow that the climate of the Peace river was inferior to that of the region about Edmonton on the Saskatchewan. It was true that in both the Saskatchewan and Peace river districts the season was none too long for the cultivation of wheat, but if the crop could be counted on as a sure one—and experience even then seemed to indicate that it might,—the occurrence of early and late frosts might be regarded with comparative indifference. The season was at least equally short throughout the whole fertile belt from the Peace river to Manitoba, though early and late frosts were not so common in the low valley of the Red river.

The almost simultaneous advance of spring along the whole line of this fertile belt, was indicated by the dates of the flowering of the various plants, a point referred to by him in some detail elsewhere. It was further unquestionable that the winter was less severe, and not subject to the same extremes in the Peace river and Upper Saskatchewan regions as in Manitoba.

LIMITING CONDITIONS OF WHEAT CULTURE.

Scientists had already found reason to believe that the early and late frosts, and not the absence of a sufficient aggregate amount of heat, constituted the limiting condition of wheat culture in the Northwest; but that neither the Saskatchewan nor the Peace river countries lay upon the actual verge of the profitable cultivation of wheat appeared to be proved by the fact that oats succeeded on the Saskatchewan, and also—in so far as one or two seasons could be accepted as evidence—on the Peace river; while it was well known that this cereal is less tolerant of summer frost than wheat.

This is further proved by the fact that at Fort Vermillion and Athabaska lake, 180 and 300 miles, respectively, northeast of Dunvegan, Prof. Macoun found wheat and barley ripening well, but in this instance the fact was complicated by the circumstance of the decreasing altitude of the country, which introduced a new condition. As no knowledge had been gained of this country on the Lower Peace in addition to that collected by Prof. Macoun in 1875, it was not included in the above discussion, though, from its additional great areas, might doubtless be added to the fertile tract.

To give some idea of the value of a tract of generally fertile country such as that described, Dr. Dawson remarked: 'Let us assume, as above, that the area of actually cultivable land is 23,500 square miles, or 15,140,000 acres. Let us suppose, for simplicity of calculation, that the whole area were sown in wheat, the yield, at the rate of twenty bushels to the acre, would be 300,800,000 bushels.

'It has often been stated, in a general way, that the cause of the exceptionally favourable climate of the Saskatchewan and Peace river countries, as compared with that of the eastern portion of the American continent, is to be found in the prevalence of warm westerly winds from the Pacific. Sir Alexander Mackenzie speaks of these

westerly winds in winter, writing: 'I had already observed at Athabaska that this wind never failed to bring us clear, mild weather, whereas, when it blew from the opposite quarter, it produced snow. Here it is much more perceptible, for if it blows hard southwest for four hours, a thaw is the consequence, and if the wind is at northeast it brings sleet and snow. To this cause it may be attributed that there is so little snow in this part of the world. These warm winds come off the Pacific ocean, which cannot in a direct line, be very far from us, the distance being so short that, though they pass over mountains covered with snow, there is not time for them to cool.'

THE CHINOOK WINDS.

'Further south, these southwesterly currents are known as "Chinook winds," and similar consequences are observed to follow their occurrence. Sir Alexander Mackenzie, however, in the summer of 1793, found the distance to the Pacific coast from his wintering place at the mouth of Smoky river greater than he appears to have imagined at the time he penned the above quoted remarks, and it is difficult indeed to understand how currents of air, blowing for at least 350 miles across a country which is for the most part mountainous, should retain enough warmth to temper effectually the climate of the plains to the east. This difficulty would appear to be particularly great in summer, when the mountains are largely snow-clad, and the mean temperature of the Peace and Saskatchewan valleys is probably considerably in excess of that of the region intervening between them and the sea.

'The complete explanation is to be found in the great quantity of heat rendered latent when moisture is evaporated or air expanded in volume, but which becomes sensible again on condensation of the moisture or compression of the air.

'The pressure in the upper regions of the atmosphere being so much less than in the lower, a body of air rising from the sea-level to the summit of a mountain range, must expand, and this, implying molecular work, results in an absorption of heat and consequent cooling. The amount of this cooling has been estimated at about 1 degree centigrade for 100 metres of ascent when the air is dry, but becomes reduced to $\frac{1}{2}$ degree when the temperature has fallen to the dew-point of the atmosphere, and precipitation of moisture as cloud, rain or snow begins; the heat resulting from this condensation retarding to a certain degree the cooling due to the expansion of the air. When the air descends again on the further side of the mountain range, its condensation leads to increase of sensible heat equal to 1 degree C. for each 100 metres. It is owing to this circumstance that places in the south of Greenland, on the west coast, during the prevalence of southeasterly winds, which flow over the high interior of the country, have been found, in winter, to experience, for a time, a temperature higher than that of the north of Italy or the south of France, though the North Atlantic ocean, from which the winds come, can, at this season, be little above the freezing point. The wind well known in the Alps as the foehn, is another example of the same phenomenon.

'The data are wanting for an accurate investigation of the circumstances of our west coast in this regard, but a general idea of the fact may be gained. We may assume that the air at the sea level is practically saturated with moisture, or already at its dew point, that in crossing the mountainous region the average height to which the air is carried is about 2,000 metres (6,560 feet), and that it descends to a level of about 700 metres (2,296) in the Peace river country. The loss of sensible heat on elevation would, in this case, amount to 10° C. (50° F.), the gain on descent to the level of 700 metres to 13° C. (55° 4F.) The amount of heat lost by the air during its passage across the mountainous region, by radiation and contact with the snowy peaks, cannot be determined. It is, of course, much greater in winter than in summer, and depends also on the speed with which the current of air travels. Taking the mean summer temperature of the coast at about 12° C. (53° 6 F.), and allowing several degrees for loss by radiation, it becomes easy to understand how the western prairies

may be flooded with air nearly as warm as that of the coast, though it has travelled to them over a region comparatively cold.

'Owing to the great width of the mountain barrier, the main result is complicated by local details, regions of considerable precipitation occurring at each important mountain range, with subsidiary dryer regions in the lee. The last of these regions of precipitation is that of the Rocky mountain range properly so called. In descending from this, a further addition of heat is made to the air, which then flow down as a dry and warm current to the east.

THE LONG SUMMER DAY.

'In addition to the favourable climatic conditions indicated by the thermometer, the length of the day in summer in the higher northern latitudes favours the rapid and vigorous growth of vegetation, and takes the place to a certain extent of heat in this respect. This has been supposed to be the case from the luxuriant vegetation of some northern regions, but Alfonse de Candolle appears to have put the matter beyond doubt by subjecting it to direct experiment. In latitude 56°, which may be taken as representing the position of much of the Peace river country, sunrise on June 21 occurs at 3h. 12m., sunset at 8h. 50m.; while six degrees further south, in latitude 50°, which may be assumed to represent Manitoba, sunrise occurs on the same day at 3h. 49m., sunset at 8h. 13m. The duration of sunlight is, in the first case, 17h. 38m.; in the second, 16h. 24m., or one hour and a quarter in excess in the northern locality. This excess, of course, decreases to zero at the spring and autumn equinoxes, and the difference is reversed in the winter.

'In further illustration of this point, the following extracts from a note in the American Journal of Science, vol. XX., p. 74, may be cited:—"It is well understood that for a plant to complete its development and mature its seeds, a certain sum of heat is required, varying according to the species. It appears—as indeed might antecedently be expected—that we should rather say a certain amount of solar radiation; for light, to a certain extent, may replace temperature. This is shown in the effects of almost uninterrupted summer sunshine upon vegetation in high latitudes. According to Schubeler, of Christiania, and others, barley ripens in eighty-nine days from the sowing in Finland, while it requires one hundred days in the south of Sweden, though the latter enjoys a considerably higher temperature. A grain of wheat grown at nearly the sea level in Norway, or in lower latitudes, when propagated at high elevations or in a high latitude, will mature earlier, even although at a lower temperature; and it is said that, within limits compatible with its cultivation, the grain increases in size and weight.

'Schubeler also makes out that grain, after several generations of cultivation in the highest latitudes or highest elevations compatible with its cultivation, will, when transferred back to its original locality, ripen earlier than grain which has not been moved. But it loses this precocity in a few generations, and the seeds gradually diminish to the former size and weight. Plants raised from seeds ripened in a high northerly locality are hardier than those grown in the south, and are better able to resist excessive winter cold.'

FREEDOM FROM INSECT PESTS.

'A further circumstance giving to the Peace river country and that on the upper part of the Saskatchewan, other things being equal, a value as farming land acre for acre considerably greater than that of most parts of the Northwest, is the immunity of this region from the visits of the devastating locust or grasshopper (*Caloptenus spretus*). * * * * *

'Reverting again to the question of climate, it is said that the Chinese, who are a very practical agricultural people, state the agricultural capability of a country by

the length of the day, counting the hours of sunlight. The greater length of the summer days largely explains the exuberance of the vegetation in those northern countries.

A COMPARISON WITH A RUSSIAN PROVINCE.

'I have a few notes here worth considering while we are dealing with the question of this northern country, particularly the Yukon. I looked up the circumstances of the northern provinces of Russia and I found, taking the province of Russia which seemed to compare most nearly with that shown on this map, both in its relation in Russia to the Atlantic corresponding to the relation of this country with the Pacific, and in its latitude, that is the province of Vologda. That province has a total area of 155,498 square miles, and it is chiefly drained to the north, like the country shown here. It lies between latitude 58 and 65. It is about 750 miles in greatest length and 300 miles greatest width. It is drained by the Dwina river chiefly. Its products are carried by this river to Archangel and exported thence in vessels by the White sea in the same way that we hope this northern country of ours may be served by the Mackenzie and the Arctic sea. The mouth of the Dwina is in latitude 65°, only a little south of the latitude of the mouth of the Mackenzie. The climate of the two countries is very similar. The winters are severe and the summers warm. There is no very heavy rainfall, such as we find near the western coasts bordering on the Atlantic and on the Pacific. The exports from that province of Vologda are oats, rye, barley, hemp, flax and pulse. The mineral products are salt, copper, iron and marble. Horses and cattle are reared; and the skins of various wild animals, pitch and turpentine are exported. This province supports a population of 1,161,000 inhabitants.

'That province is not in Siberia but in Russia proper. Now, we have areas to the north which may make several provinces like Vologda, and for the purposes of illustrating this point I have made a very rough calculation here which as it is founded largely on suppositions, is perhaps scarcely worthy of being presented to the committee, but may serve to give an idea. With reference to the agricultural area of Peace river I confine myself to a tract roughly marked on the map as to which I have some personal knowledge. Without going over what I have already written in reply to that question and which is largely embodied in a report published some years ago, I may say that the area which is included in the upper portion of the Peace river country, is about 31,500 square miles. The proportion which I estimated as arable land is 23,500 miles. That would give 94,000 quarter-sections if it were sub-divided. Reckoning a family of five persons on each, that area would be capable of supporting a population of 470,000, or in round figures say 500,000. I do not think it would be at all beyond the mark (though I am speaking now from the reports of others, because I have not been further down the Peace river myself), to assume that there is another area at least equally great of arable land in the Mackenzie valley to the north of this. That will give another population of say 500,000. Now, if we take the headwaters of the Mackenzie and the Yukon west of the mountains, I think we will be well within the limits of probability if we say that we have there 30,000 square miles of that region which may be cultivated with advantage. This, on the same basis as before, would support a population of 600,000 persons, or a total of say 1,500,000 persons in the Mackenzie valley, and adjacent tracts, to the north altogether of the Saskatchewan watershed, and on the west of the mountains, north of British Columbia. I think we might, without exaggeration, by including miners, fur traders, hunters, lumbermen and those engaged in transport or trade, besides those in outlying fertile sections not included in this—double the total just arrived at. This will give us a population of 3,000,000 people in that part of the Dominion alone. As I am not personally familiar with the Lower Mackenzie region east of the mountains, I may have underestimated its value.

In answer to a question, Dr. Dawson stated that the warm climate in winter had long been known to occur as far north as Fort Simpson, and observations by Abbé Petitot appeared to show that they extended quite to the mouth of the Mackenzie

EXTRACT FROM A REPORT BY MR. W. OGILVIE.

During his examination, Dr. Dawson read to the committee an extract from a report made in 1884 by Mr. W. Ogilvie, of the Geological Survey, on the Athabaska and Peace river valleys. The extract in question, in part, was to the following effect:—

'All the way down the Athabaska to the lake the country is (with the exception of a few meadows) thickly wooded, and a great deal of it swamp and marsh, interspersed with lakes and ponds.

A great deal of the soil along the bank was of very fair quality. At Fort McMurray, where there is a couple of small prairies or meadows, the soil is good, and the root crops and garden produce raised there are generally very good. The Hudson Bay Company have a garden at the fort (McMurray) of upwards of an acre in extent, and the Episcopal mission one of smaller area, but the soil is very sandy. The Roman Catholic mission have a garden also, most of which they obtained by draining a bog into the lake.

In the season of 1883 (which was a pretty favourable one in that district, being free from summer frosts) the Hudson Bay Company raised about 400 bushels of potatoes, the Episcopal mission 30 bushels on a small patch, and the Roman Catholic mission about 500 bushels.

Many of the retired Hudson Bay Company's servants also have small patches which they cultivate, potatoes and fish being the principal articles of food used during the winter.

Opposite Vermillion, on the north of the river, there is an extensive tract of prairie and poplar bluff country, which extends from the Peace to the watershed between the Peace and Mackenzie rivers, southwestward along the Peace for about forty miles or more, and northeastward along the river a few miles, until it merges into the country already described. This is said to be a first-class country in every way, well wooded and watered, with a rich, deep, black loamy clay soil; and if the life of flowers and berries be any indication of freedom from frost, this district is favoured in this respect as the berries ripen here when they are killed in the surrounding parts.

The country southwestward from the end of this tract to Battle river is described as woods and swamps, alternating with patches of prairie and open woods, and from the Battle river to the prairie near Dunvegan generally drier and with more prairie.

It appears, therefore, that from Dunvegan, on the north side of Peace river, down the river to Peace point, and thence to Salt river on the Great Slave, there is a tract of country about 600 miles in length and forty miles wide, of which a large percentage is fit for immediate settlement, and a great deal more could be very easily closed.

Of the country southeast of the Peace, between it and the Athabaska, very little is known. It was described by all whom I met, who had seen any portion of it, as a rolling surface, the ridges heavily wooded with fair timber, and many of the basins containing swamps and lakes of considerable size. Out of one of the latter, Lake Wapisca, the Loon river flows into the Peace, and another stream called by the same name into the Athabaska, at Grand Rapids. Some of the ridges rise into high hills, and in some of these, rock exposures are said to be visible.

At Dunvegan, notwithstanding the severity of the frosts, the crops were very good, both in quality and quantity. When I was there, the Roman Catholic missionaries had threshed their grain, samples of which I brought back. The yield was as follows:— 50 pounds of wheat were sown on April 16 and reaped on August 20, and 27 bushels threshed of good clean grain; 15 pounds of Egyptian barley sown on April 18, and reaped August 20, and 15 bushels threshed, weighing fully 60 pounds to the bushel. The Hudson Bay Company and Church of England mission had not threshed, and could not give their returns; but they were well satisfied with their crops of all kinds. The Rev. Mr. Brick, of the Church of England mission, was already using bread, when I was there, made from wheat of the present year's growth.

COMMUNICATION FROM BISHOP BOMPAS.

An interesting communication was submitted to the committee from the Right Reverend W. C. Bompas, D.D., at the time, as he had been for many years previous, Bishop of the Church of England missionary diocese of Athabaska. The letter was dated Fort Chippewyan, Athabaska lake, August 12, 1880, and had originally been addressed to the governor of the Northwest Territories.

The bishop pointed out the necessity for teaching the Indians by example the art of cultivating the soil. He pointed out that the Peace river country had capabilities that might 'fit it for becoming the granary of a large country.'

Besides the natives the only residents in the country then (1880) were fur companies' agents and the missionaries. Of these the former had little interest in promoting the cultivation of the northern part of the territories, as it was rather their policy to retain it as a fur reserve. The missionaries feared to devote too much attention to the secular pursuits of agriculture, as their funds and employments were intended for religious objects.

'In case the government should think fit to assist in this matter in the interest of the native tribes, and of the development of the country generally, the bishop recommended that this be attempted by the appointment of two government industrial agents, one for the Peace river and one for the Liard, at a moderate salary, with a limited supply of farming implements, and that practical Canadian farmers be selected for these posts. Such appointments would exhibit the regard of the government for the welfare of the country more than the appointment of magistrates or police, or any agents having more directly the character of a ruler. The expense would be but trifling and the advantage great. The duty of the agents would be to establish farms on the two rivers named, and by this example to encourage the Indians to do the same. The produce of the farms would admit of Indian children being gathered together for schooling, which scarcity of provision at the time forbade, and the result of the effort might be the settling of the whole country on a solid basis of civilization and advancement.

It would be observed, His Lordship continued, that he did not apply for government money to be granted for this purpose to private individuals, as he thought it would be more satisfactory for the government to commence the effort themselves, and they would be at liberty to relinquish or transfer it as soon as the objects in view had been so far attained that they might be safely left to private enterprise. A moderate farm on the Liard river could supply with flour any part of Mackenzie river and a farm on Peace river the same in the Athabaska district. The conditions for agriculture were probably about equally favourable in each case.

Bishop Bompas explained that he considered much would be accomplished by establishing steam navigation (a wish shortly afterwards realized) on the Mackenzie river. He had no expectation that any obstacle would be found in the way of a light draught steamer reaching the Mackenzie from Behring strait, and he stated this, partly from personal inspection of the coast ,and also from the testimony of the natives.

EVIDENCE OF MR. WILLIAM JAMES McLEAN .

Written answers to the set schedule of questions prepared by the committee were submitted by Mr. William James McLean, chief trader of the Hudson Bay Company, Lower Fort Garry, Manitoba.

Witness explained that his personal knowledge of the country under investigation covered trips over the following routes:—From the watershed of the Mackenzie river

basin at the height of land whence the Clearwater river takes its rise, down the aforesaid river to its confluence with the Athabaska river, thence down the Athabaska river to Lake Athabaska and from there to Great Slave lake down the Slave river, and out Lake Athabaska, and on through that lake down the Mackenzie river to Fort Simpson, thence up the Liard river to Fort Liard, where he was stationed for ten years, from 1863 to 1873.

AGRICULTURE.

Witness tried to raise Indian corn at Fort Liard, but with poor success. He planted potatoes and barley there generally about May 10, and reaped barley about August 20. Potatoes were fit for use about that time; but were generally taken out of the ground about September 20. Turnips were planted and dug about the same date as the potatoes. Wild flowers first appeared in the spring about May 25 at Fort Liard, and June 10, at Fort Simpson.

Wild strawberries were ripe about the first week in July, gooseberries about the first of August. Other small fruit came in from the middle of July to August 10.

The wild vetch or pea grew at Fort Liard, but not to any great extent.

Forts McMurray, Chippewyan, Resolution, Simpson and Liard grow good barley.

FORESTRY.

Spruce, birch and tamarack are the only trees of any value. The size will compare favourably with such trees as are utilized for the manufacture of lumber in Manitoba. There is a large quantity of this lumber on the Athabaska, Mackenzie and Liard rivers.

CLIMATE.

The weather during the three growing months of summer was generally very hot at Fort Liard, with occasional thunderstorms and rains. The nights were generally cold. There were occasional summer frosts, but they were purely local. The summer rains began about the first of May. The climate did not differ to any great extent from that of Manitoba. This probably arose from the effect of the Chinook winds, which were frequently felt during the winter season.

The Liard generally freezes about the middle of October and opens about the 8th of May. The Mackenzie freezes about October 10 and breaks up about June 1.

COMMUNICATION FROM REV. FATHER PETITOT.

Prof. Bell submitted to the committee a letter he had received from Rev. Father Petitot, O.M.I., of Fort Good Hope, dated August 16, 1873, in reply to a letter from Prof. Bell, written May 30, the previous year.

The reverend gentleman in his letter explained that he had travelled extensively through this vast region and proceeded to give a most interesting geological account of the country, although he undoubtedly disclaimed any merit as a geologist.

Points of practical interest drawn attention to in this communication were the following:—

'To the south and to the east of the banks of the Great Slave lake are flats, composed of alluvium and gravel. On the islands off shore asphalt is found, the hardened debris of which is strewn on the beach.

'Going down the Mackenzie river, at the mouth of the river Na-hanni, a conical hill, rises for some 800 feet in height, at the summit of which, the Indians say, is a salt spring.

'At the foot of "Rocher qui Trempe à l'Eau" there is a little eminence, ten or twelve feet high, whence flows a mineral spring containing alum, sulphate of iron and magnesia, which communicates a yellowish colour to the rock. Similar exudations also show on the top of "Rocher qui Trempe à l'Eau."

'Lower down than the Elbow, the Mackenzie is bordered on the right by the chain of the Clarke Rocks, the culminating point of which appears to be about 1,900 feet high. It is of a high saddle-back shape, seen from in front, and like a melon cut open, seen from Fort Castor, qui Déboule. Its structure is calcareous. It contains mines of gemmeous salt, and a salt river flows from its foot. This chain is prolonged very far to the north. It first crosses Great Bear Lake river and there forms the Grand rapid, 15 miles long. Much coal-bearing sandstone is found along this rapid, and the mountain on its left bank is also composed of it, but that on the right bank is calcareous all along to its junction with the Kfivè-tchô-dêtêlle chain on the banks of the Peaux de Lièvre river.

INTERESTING GEOLOGICAL GROUND.

'Six miles above Fort Norman, and for an extent of from 8 to 10 miles, the Mackenzie is bounded on its right bank by a precipice which reaches at first about 150 feet in height and gradually diminishes to a height of 30 feet. It is a vast tertiary deposit composed of alternate stratifications of friable schist, lignite, pipe-clay and vegetable mould. The schists are in a state of combustion winter and summer, but the subterranean fire which shows itself on the surface through smoke holes, stinking of bitumen, is intermittent, and breaks out sometimes at one point, sometimes at another. It is not always visible at the surface, but at others is very active. The soil is very hot, damp and movable in the neighbourhood of these smoke holes. Walking is obstructed by heaps of volcanic earth and puzzolana. The pipe-clay has been roasted by the subterranean fire and transformed into brick. It contains, or rather it is nothing but an immense mass of leaves of trees, the parenchyma of which has been destroyed, but the fibres and all the lineaments of which appear upon the thin bed of clay which covers them in such a way as to resemble impressions. I have been able to distinguish perfectly, leaves belonging to the genera *acer viburnum, taxum* and *pinus*. It may also be said that impressions of caryopses of maples in thick tufts are found in this clay.

'The lignites are not fit for forging work. Sometimes even the trunks of the trees which form the beds of it have been transformed into clay; however, all this debris has evidently undergone the action of fire. They contain numerous petrifactions. Several pieces of smooth grain, which I took at first for palms, now seem to me to be maple. Many other pieces which I have found and handled are white spruce. For three years I was able to observe an enormous petrified spruce trunk which lay at the mouth of Great Bear Lake river. I was not able to find it again this summer; the ice must have carried it away or covered it up.

'These petrifactions present places converted into quartz, or rather encrusted with quartz, whilst others are encrusted with iron shine. Indeed, certain parts are intact, and show the wood just as it was. This place is called Les Boncaner. Porcelain clay, red ochre, and asphalt hardened by the water are also to be remarked there.

Great Bear Lake river, or Franklin river, presents alternations of granite, limestone, and coal-bearing sandstone.

'Traces of fire are visible in the mountain range at the mouth of the discharge of Great Bear lake, large patches of poppy-red coloured earth spotting the flanks of the mountain about 400 feet high. A little lower down, below the rock, the beaches of the Emir present unequivocal traces of other schistose holes which have been extinct for a long time, but which the writer of the letter found in combustion in 1869. At the foot of the mountain is a spring of sulphurous water.

'The double chain of the Rocky mountains, which encloses the Mackenzie from this point (described in preceding paragraph) to the rapid Sans Sault, is calcareous.

The last mountains on the right bank present stratifications in their precipices. They are inclined from northwest to southeast. In this district are found other sulphurous springs, as well as mines of asphalt in the marshes. All this is on the right bank, which seems the best portion. It is always on this side that traces of the volcanic elements are to be observed, from the mouth of the Eau Claire river to the Arctic ocean.

'At the extremity of the expansion of the Mackenzie, which has received the name of Grande Vue, is found a transverse rock 300 feet high and several miles long, which causes the waters of the stream to deviate towards the northwest. This is Rocher Rouge, called also Rocher Carcajou. It presents a steep slope formed by sliding earth and by landslips, which were in a state of combustion in 1868. I saw with my own eyes the fire and the smoke, an evident proof that there are tertiary beds existing below, similar to those of which we have spoken above, and which have been the cause of the landslips in question. Farther on, this range presents large vertical beds of stratified limestone similar to that of Rocher qui Trempe à l'eau. It is similarly veined with quartz, and it is said that there are also to be seen there coal-bearing sandstone, sulphurous springs, asphalt, and iron shine in the marshes.

'The left bank, opposite Rocher Rouge, exudes feruginous water, which stains all the water-borne shingle of the beach with oxide of iron.

'The Rapid Sans Sault presents friable schists similar to those seen further up and obliquely stratified. This inclination is from northwest to southeast, that is to say, running inversely to the stratification presented by the mountain. At the foot of the rapid there is a sulphurous spring on the right bank, and calcareous rocks piled on a base of pudding stone, as in the river Athabaska.

'I learn from the Eta-gsttinê Indians, who frequent Fort Good Hope, that between the Sans Sault rapid and Fort Good Hope, in the valleys of the Rocky mountains, volcanic formations and tertiary deposits are met with, similar to those of Fort Norman and of the Porcupine river. These Indians have spoken to me of red and blue earths, of sulphur and of extinct smoke holes.

'Three or four leagues below Fort Good Hope, iron pyrites is found on the beach, and the Peaux de Lièvre Indians formerly used to use it to strike fire with. In several of the marshes in the neighbourhood of Good Hope a white earth is found, a sort of gypsumous tufa, as well as asphalt in great quantity.

'On the right bank opposite the site of the old Fort Good Hope, there are again natural ramparts of limestone or schistose sandstone (I do not remember which) at the mouth of Thunder river. Traces of fire are very visible in these rocks, which are from 80 to 150 feet high. One finds there hæmatite, or oxide of iron; sulphate of iron and sulphate of magnesia; alum, which exudes from the fissures in the stone; and red ochre. It was here that the Peaux de Lièvre discovered in ancient times the hæmatite ,which on account of its colour, resembling the dung of the black bear, they called Sa-ts-anne, that is to say, bears' excrement.

'The second ramparts of the Mackenzie, called the Detroit or Narrows, are composed of lias and limestone, which exude alum and saltpetre. Lower down are schistose sandstones of which the Esquimaux make the heads of their arrows.

On the sea coast and the right bank the Esquimaux have told me that there are caves containing fossilized bones of large antediluvian animals, particularly of the mastadon, of which they have shown me pieces of tusks of the finest ivory, which they call *killagvark,* and which they know how to distinguish from the ivory of the walrus, or *turark.* They have also told me that there are, upon the sea shore to the eastward, tertiary deposits in combustion, similar to those at Fort Norman.'

NORTHERN LIMITS OF CERTAIN PLANTS.

The reverend gentleman indicated in his report the northernmost limits of certain plants and animals, as follows:—

The rapids of the Slave river are the northern limit of the male fern (*Asplenium*), of the Canadian honeysuckle (*Lenicera Can.*), of the Turk's cap, and of the wild pansy (*Viola tricolor*).

Montagne la Corne, is the northern limit of the asphodel, of the *ficaria aquatica,* of the *campanula, ranunculus* and gold-eye (*hyodon chrysopsis*).

Fort Norman is the northern limit of the saskatoon, gooseberry, and of the cereals; also of the curlew and golden plover.

At 60 degrees, 50 minutes latitude, the spruce disappears.

EVIDENCE OF DONALD McIVOR.

Donald McIvor, farmer, of Kildonan East, Manitoba, who had been sixteen years in the Hudson Bay Company's service, and had been stationed in the Mackenzie river district for over six years, communicated in writing a very interesting series of answers in response to the schedule of questions submitted by the committee. Witness explained that he considered he had fair knowledge of the district watered by the Mackenzie, Athabaska and Slave rivers.

AGRICULTURE.

The soil is black loam chiefly, sometimes a little sandy. Witness considered three-fourths of the country fit for pasturage or coarse grains. Barley and potatoes had been grown successfully as far north as Fort Norman. He saw some wheat, very fine, at Portage la Loche, grown by an Indian, but did not know of its being tried further north then. He never saw any Indian corn during his stay in the district. At Fort Athabaska, barley sown the middle of May was ready for reaping the first or second week in August. Further north, at Fort Norman, barley sown the middle of May, could be reaped the middle or the last week in August.

In cases where wheat was grown it ripened about the last week in August, potatoes the first of September. The ground was usually fit for seeding about three weeks after the first spring flowers showed. The summer rains began about the latter end of May.

At the time witness was in the country nothing was done to any extent in agriculture. Stock raising was carried on at most of the forts, and succeeded admirably.

It is a splendid region for small fruits. The wild raspberries, strawberries, gooseberries and cranberries, high bush and low bush, are very large. Strawberries ripen the middle of July, gooseberries the first of August.

FORESTRY.

Along the shores of Lake Athabaska there is pine, spruce and tamarack of large size. Great tracts of timber are to be found along the Mackenzie, the Peace and the Athabaska, and throughout the whole district. Spruce, birch, tamarack, and poplar, are the chief woods. The larger size spruce often measured 4 to 5 feet in diameter.

FISHERIES, FUR AND GAME.

Mr. McIvor stated that he thought that nowhere in the eastern provinces were there such valuable fisheries as in the Mackenzie Basin waters. Whitefish, plentiful in the lakes and rivers, is the most important fish. He recalled on one occasion, having, with another man, taken in one day, with nets, 2,500 whitefish weighing from four to five pounds from Great Slave lake. They are most numerous in the autumn and are taken till the first of February.

Trout are also very numerous and very large, weighing, often, 30 or 40 pounds. They are caught in the spring through holes cut in the ice.

Pike, running in weight from 12 to 15 pounds, are most numerous.

The principal fur-bearing animals are the lynx, very numerous about Great Slave lake, but found throughout the whole district; Arctic fox, found towards the coast; black fox, silver fox and cross fox, throughout the district; fisher, in the mountains; wolverine; otter, not very numerous; beaver, very numerous all through the country; marten, very numerous, almost all over; mink, not so numerous; ermine, very plentiful; muskrat, 'thick as mosquitoes.'

MINERALS.

Regarding gold, witness had heard of it being found, but had never seen it. Iron could be found throughout the whole country, and was very plentiful on the shore of Great Slave lake, running into it by little streams. Coal was in great abundance in the banks of the Mackenzie, and elsewhere. He had seen there a fire burning, which the oldest inhabitant could not remember starting, and it was burning, he understood, at the date of the investigation. There was a white clay on the Mackenzie which he believed would be most valuable for pottery. There were quantities of lime and sandstone, while granites were found all over the district.

CLIMATE.

The climate of the summer months in the Mackenzie basin was greatly similar to that of Manitoba. It was lovely, warm, sunny weather, the thermometer ranging from 70 to 80 degrees, with just enough rain for vegetation. The snow in winter was from three to four feet deep.

The warm effects of the Chinook wind were felt in the winter at Fort Simpson and upwards to Great Slave lake.

At Forts Chippewyan, Resolution, Simpson and Halkett, the frost penetrated the soil from 4 to 5 feet. Nearer the coast at Fort Norman and Good Hope it penetrated about 5 feet, and so on towards the coast.

Witness remembered no summer frosts in June, July and August. The month of September was warm, but there was frost often at night. October was cooler with frost as a usual thing.

The climate in winter was intensely cold, but did not seem to affect plant life.

REPRODUCED FOR REVISED 1908 EDITION.

MAP to accompany Report of Senate Select Committee on Resources of Great Mackenzie Basin.

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